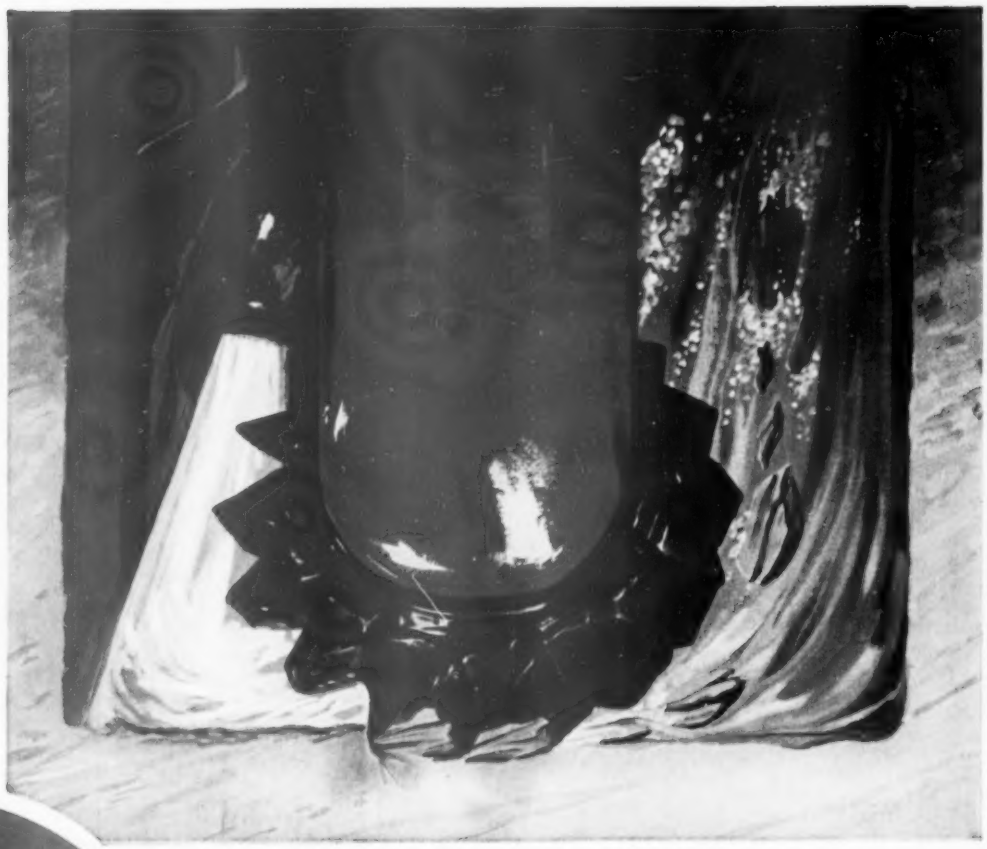
the OIL AND GAS JOURNAL

Better bottom hole cleaning---

means more hole per bit!



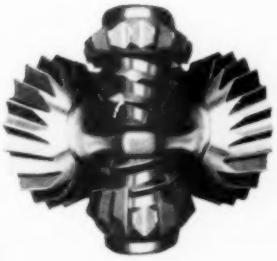
REED

TWIN-BLAST

ROCK BITS

available in both two-cutter and four-cutter styles for

FASTER DRILLING IN ANY FORMATION!



REED ROLLER BIT COMPANY

HOUSTON 1, TEXAS

4108

PRICE 50 CENTS TABLE OF CONTENTS ON PAGE 1 **FEBRUARY 8, 1954**

Unusual Tree,

But as Usual...

ROCKWELL Nordstrom VALVES

Certainly you expect to find Rockwell-Nordstrom lubricant-sealed valves on all kinds of Christmas trees.

As it happens, this is a tree in the Freer Field, Duval County, Texas, with 15,000 lb. test, 10,000 lb. working pressure Rockwell-Nordstrom valves.

But it could be a low pressure tree, and it could be in California, or Arabia, or anywhere else where oil and gas flow from the ground.

No flowing well is safer than the valves that control it, and no valves are safer than Rockwell-Nordstrom. In Christmas tree service, where valves may stand in one position for long periods, yet must operate quickly and surely in an emergency, the Rockwell-Nordstrom principle of internal lubrication is especially important. The lubricant jacks the plug off the valve seat, and at the same time gives a slick surface for almost friction-free operation.

There is a proper Rockwell-Nordstrom valve for any Christmas tree service, readily available through oil country supply stores everywhere. Rockwell Manufacturing Company, Pittsburgh 8, Pa. *Canadian Licensee: Peacock Brothers Limited.*

ROCKWELL
Nordstrom
VALVES

Lubricant-Sealed for Positive Shut-Off

the OIL AND GAS JOURNAL

FEBRUARY 8, 1954 VOL. 52 NO. 40

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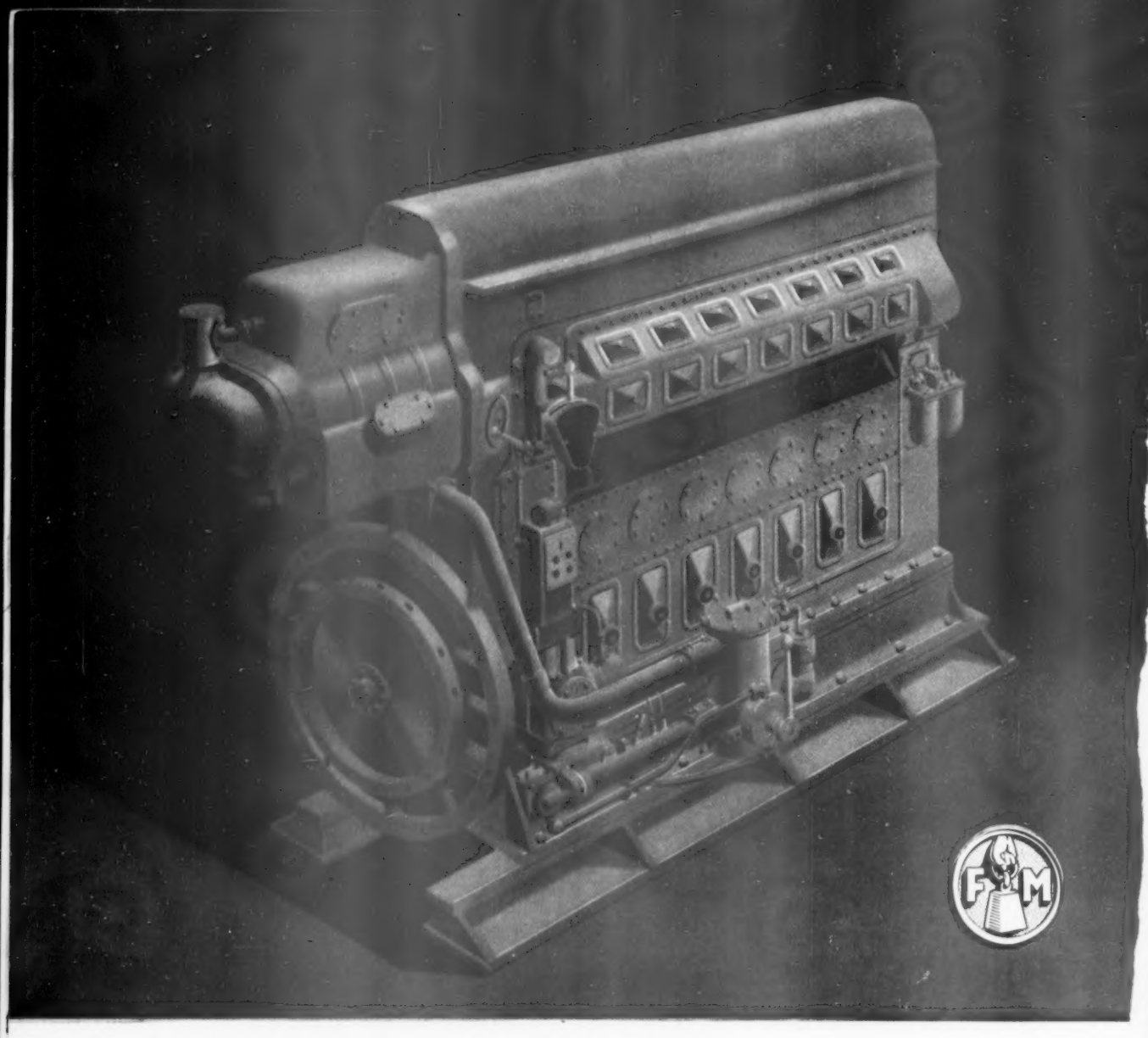
In Brief . . .

1. BETTER CRACKER DESIGN . . . Sinclair Refining Co.'s new 40,000-bbl. fluid catalytic cracking unit at Houston has the following outstanding features: (1) a sectionalized stripping section in the reactor; (2) a new bed-level control arrangement in the reactor; (3) a novel support for the regenerator grid; (4) a CO boiler and regenerator superheater; (5) a compact reactor-regenerator setup; and (6) layout provisions to simplify maintenance.

2. DEVELOPING LEADERSHIP . . . The increasing complexity of present-day businss calls for a higher degree of leadership ability than was recognized in the earlier stages of industrial development. If the business is to be successful, it must have capable leadership at all levels of operation—from first-line supervision to the president of the company. Top management develops, almost without exception, by growing from job to job. Providing adequate leadership in all functions and at all levels of the organization is one of management's most important jobs.

3. SUBMERGED DRILLING . . . A new type drilling barge which sinks its own engine room to the bottom of the ocean is one of the latest approaches to the problem of successfully drilling over deep waters in the Gulf of Mexico. Outstanding features of this submersible diesel-electric unit are: (1) drilling equipment is actually submerged at drilling site; (2) barge can operate efficiently in waters up to 40 ft. deer; (3) the barge unit is completely integrated, with all components welded to each other; and (4) design allows better positioning of the barge over the actual well site.

4. NEW SLIDE RULE . . . A new hydraulic slide rule, developed by Service Pipe Line Co., can be used to solve fluid-flow problems encountered in the design and operation of crude-oil pipe lines. Any one of the five variable factors—flow rate, pressure, diameter, viscosity, and specific gravity—can be determined under conditions of either streamline or turbulent flow if the other factors are known. The rule is as accurate as accepted formulas and charts, and is relied upon for the final solution of gathering-line and trunk-line problems.



The Fairbanks-Morse Opposed Piston Diesel Model 38F 90. 225 to 750 horsepower.
Diesel Dual Fuel and Spark-Ignition options.
Other O-P engines available in horsepower ratings to 2400.

. . . the price is more but the cost is less

You can buy many diesels for a little less than this Fairbanks-Morse OPPOSED PISTON Diesel . . . but no engine working at rated load can deliver power more reliably at less cost. The slightly higher price is quickly offset by the freedom from maintenance and service interruptions.

More engine hours of unfailing service mean fewer man-hours in maintenance and repair.

Fairbanks, Morse & Co., Chicago 5, Illinois

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For rotary drilling

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For well servicing

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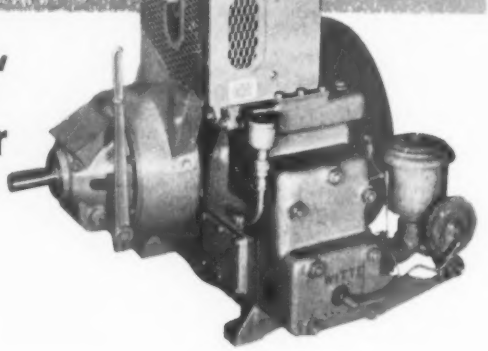
You'll get maximum service from wire rope that has been specially designed for a special job. Over the years, ropes for all types of equipment in every field have been developed by Macwhyte. It will pay you to get Macwhyte Wire Rope that has been job-proved and engineered for your particular equipment. Recommendations are promptly available from Macwhyte distributors or Macwhyte Company.

MACWHYTE COMPANY, *2916 Fourteenth Avenue, Kenosha, Wisconsin. Manufacturers of Monarch Whyte Strand PREformed, Internally Lubricated Wire Rope, Atlas Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal and Stainless Steel Wire Rope. Mill Depots: New York • Pittsburgh • Chicago • St. Paul • Fort Worth • Portland • Seattle • San Francisco • Los Angeles. Catalog on request.* 996-B.

. . . the Oil Field WITTE Model "98" . . . designed especially for your smaller pumping installations.



● The Witte Model "98" is a gas-gasoline, horizontal, single cylinder, condenser cooled engine with single flywheel and lever-operated clutch power take-off. It has a medium speed range of 500 rpm to 1200 rpm and, for continuous 24-hour-day operation, is rated from 4 to 10 horsepower.

The Model "98" is compact in design, simple to operate and has such characteristic Witte, *built-in*, engineering features as: aluminum piston, removable-wet-cylinder liner, tapered-roller-main bearings, crankshaft dynamically balanced with integral counterweights and simple, splash lubrication.

Write today for complete information about the Oil Field Witte Model "98" Engine.

WITTE Model "98RC"

Gas-Gasoline Engine

Rated at 4 to 10 horsepower for continuous operation

WITTE ENGINE WORKS

OIL WELL SUPPLY DIVISION, UNITED STATES STEEL CORPORATION

Kansas City 26, Mo.

WITTE ENGINES

Gas-Gasoline models from 4 to 15.5 hp

Full diesel models from 3.75 to 12.5

USS

UNITED STATES STEEL

TOUGH JOB?

As far as the eye can see—Link-Belt roller bearing cast steel pillow blocks and helical gear drives are used on roller conveyor units built by the Enterprise Co., Columbiana, Ohio, for Lone Star Steel Co.'s pipe mill. In addition, Link-Belt chains, worm, herringbone, fluid and P.I.V. variable speed drives are used on cooling and transfer beds.

READY ANSWER:

LINK-BELT roller bearing cast steel pillow blocks chosen for Texas' newest pipe mill

High temperatures from heat-treating furnaces . . . heavy, continuous loads . . . frequent, severe impact. You'd have a hard time finding a tougher set of conditions for bearings. Yet that's exactly the combination encountered by the roller conveyor units in a pipe mill.

That's why many of the manufacturers of important equipment for Lone Star independently specified Link-Belt bearings. This selection in all cases was approved by the designing and supervising engineers, A. J. Boynton and Company.

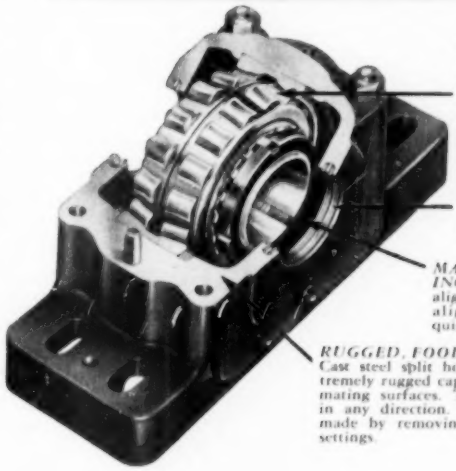
For your toughest shaft support jobs, it will pay you to investigate the possibilities of these self-aligning roller bearings housed in cast steel. Ask the Link-Belt bearing specialist in your field for complete information.

LINK-BELT

BALL and ROLLER BEARINGS keep company with America's hardest working equipment

13.428

LINK-BELT COMPANY: Indianapolis 6, Houston 1, Dallas 1, Los Angeles 33, Scarboro (Toronto 13); Export Office, New York 7. Distributors in All Fields.



FREE-ROLLING SELF-ALIGNMENT. Adjusts immediately in all directions to shaft deflections and inaccuracies of mounting. This is important because bearing must withstand heavy, shock loads.

LUBRICATE WITH OIL OR GREASE. Spiral steel seals effectively retain either type. Housing sealing fully protects all moving surfaces at all times.

MAINTENANCE AND STOCKING SIMPLIFIED. No shims or alignment rings needed for self-alignment. No adjustment required after a disassembly.

RUGGED, FOOLPROOF INSTALLATION. Cast steel split housing has heavy section, extremely rugged cap, large size studs, dowels and mating surfaces. Takes maximum radial loads in any direction. Complete inspection can be made by removing cap without altering base settings.

Series LPK6800F Roller Bearing Cast Steel Pillow Block is part of Link-Belt's line of pillow blocks, flanged, flanged cartridge, cartridge, take-up and hanger blocks and unmounted bearings.

The Oil and Gas Journal, published Mondays, copyright 1954, by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $4 yearly.

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APPLETON

Explosion-Proof! Dust-Tight! Rain-Tight!

CIRCUIT BREAKER, MOTOR STARTER and COMBINATION MOTOR STARTER

UNILETS

REG. U.S. PAT. OFF.

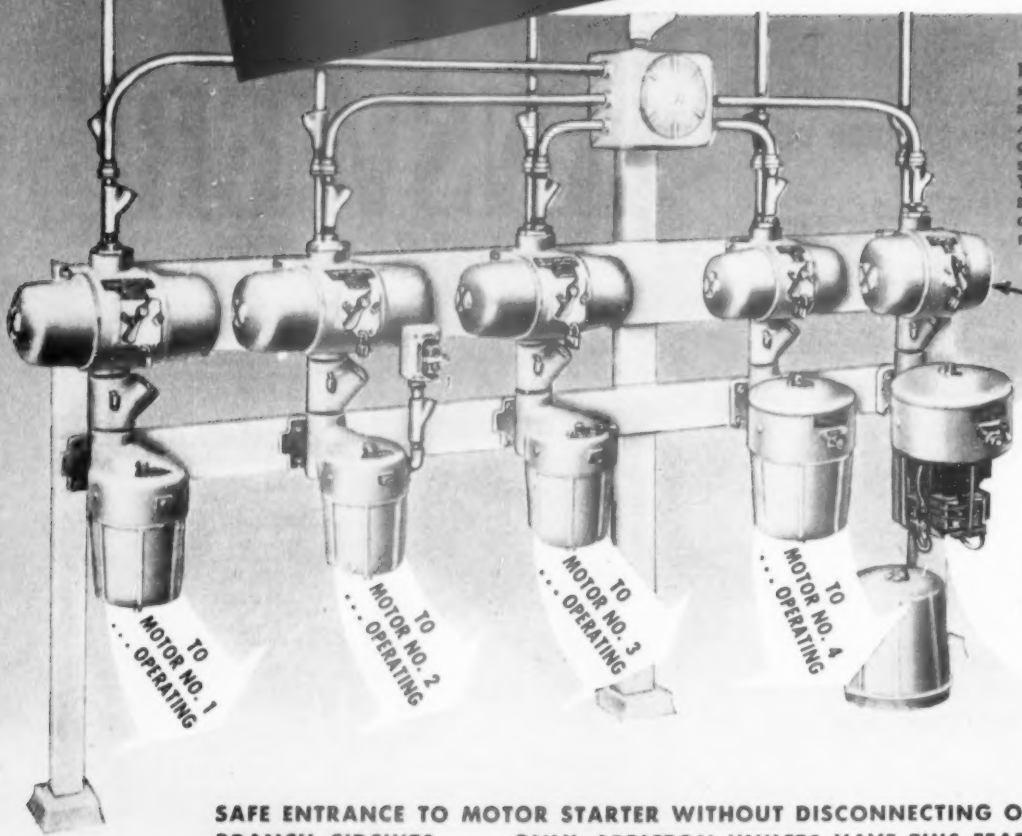


Illustration shows the high safety factor, versatility, and space-saving attributes of *Appleton* explosion-proof circuit breaker and motor starter *Unilet* Combinations. Your own installation needs, no matter what they may be, can also be met with these remarkable new Unilets.

BREAKER LOCKED IN "OFF" POSITION

MOTOR STARTER NO. 5 . . . EXPOSED FOR SAFE MAINTENANCE . . .

but no "down time" on other operating equipment

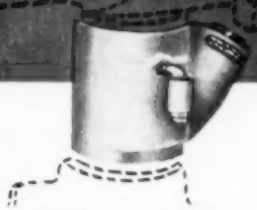
SAFE ENTRANCE TO MOTOR STARTER WITHOUT DISCONNECTING OTHER BRANCH CIRCUITS . . . ONLY *APPLETON UNILETS* HAVE THIS FEATURE!

U. L. APPROVED

"CB" Circuit Breaker UNILETS

Assure easy, safe, flexible, and economical installation for protection of service entrance, feeder or lighting, appliance, and branch circuit conductors up to 225 amperes. U. L. Approved individually and in banked groups up to three for forms 1 and 2 without using dividing seal.

U. L. APPROVED



Sealing UNILETS

Available for use as explosion-proof seal where needed on circuit breaker and motor starter Unilets. This Sealing Unilet is furnished on all Combination Motor Starters, and when properly sealed permits safe entrance to a motor starter in single or banked combination installations, without disconnecting other branch circuits.

U. L. APPROVED

"LS" Motor Starter UNILETS

For 3-phase induction motor control up to 100 H.P. at 600 volts maximum. Lightweight construction of larger sizes eliminates need for heavy lift equipment . . . assures easy, time-saving, inexpensive installation. Also made for reversing and two-speed motors.

The greatest advance in explosion-proof design in years!

● You expect more from *Appleton,* and you get it! The proof lies in these completely new and different *Appleton* circuit breaker and motor starter *Unilets.* Alone or in combination, their design, construction, and performance give you maximum safety, unparalleled ease of wiring, installation and maintenance, and initial and long-term money savings not available with any other equipment! You'll find their exclusive features invaluable on any hazardous-location motor control or power lead-in installation, large or small, indoors or outdoors, where tricky wiring, corrosive and flammable atmospheres, dust, or weather difficulties appear insurmountable. Where absolute safety is required day in and day out and every minute of the day, you can place complete confidence in *Appleton Unilets.*

IMPORTANT ADVANTAGES

- **FIRST to be U. L. Approved for BANKED Circuit Breaker Grouping**
- **Combinations Meet U. L. Requirements through Approval of Components**
- **FIRST to Achieve Safe Entrance to Motor Starter of a Combination without Shutting Off Other Branch Circuits**
- **Full 7-Thread Explosion-Proof Protection . . . No Bolts to Strip or Flanges to Nick**
- **Unmatched Accessability for Easiest Wiring and Servicing on Every Job**
- **Light-Weight Construction for Easy Installation without Heavy Lift Equipment**
- **Quick Interchange on All Leading Makes of Circuit Breakers and Motor Starters**
- **Flexible Field Set-ups Assured with Single and Duplex Male and Female Hub Adapters**

BANKED CIRCUIT BREAKER GROUPING

Male to female hubs permit easy grouping. Cuts costs, streamlines panel set-ups, assures coordinated control without sacrificing safety. U. L. Approved up to groups of three in smaller size Unilets.

VERTICAL "STRAIGHT-THRU" DESIGN

Simplifies wire pulling, saves time. Ample working space eliminates need to remove breaker mechanism from enclosure, yet assures clean, safe wiring.

Patent Applied For

OVER-SIZE CONDUIT and CONDUCTORS

May be run with hub adapters for subsequent installation of higher rated breakers without replacing complete Unilet or existing conduit.

PUSH-BUTTON and PILOT DUTY CONTROL

Combines convenience and selectivity including built-in "Start-Stop," "Hand-Off-Auto.", or "Jog-Run-Off" control where needed.

Sold Nationally Through Electrical Wholesalers

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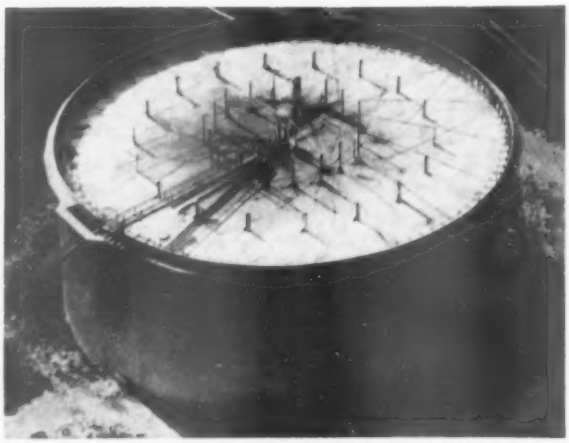
For the economical storage of sour-crude, gasoline, and refined products, you can rely on a floating-roof tank that's Bethlehem-built. We've had long experience in building them in any practical diameter to meet a variety of conditions.

In each of the three types of tanks the roof floats on the surface of the liquid. The few inches of annular space between the steel roof plating and the tank shell is well protected by sealing plates which slide against the inside of the tank shell. Rubberized asbestos fabric is used to close the space between the top of the sealing plates and the deck. The shoe plates are forced into contact with the shell by adjustable springs.

Easy access to the roof is provided by a rolling ladder. Manheads, vents, guide brackets, drain hose and other fittings are furnished to meet your requirements.

The next time you are considering the need for a floating-roof tank, we suggest you get in touch with the nearest Bethlehem sales office for complete information.

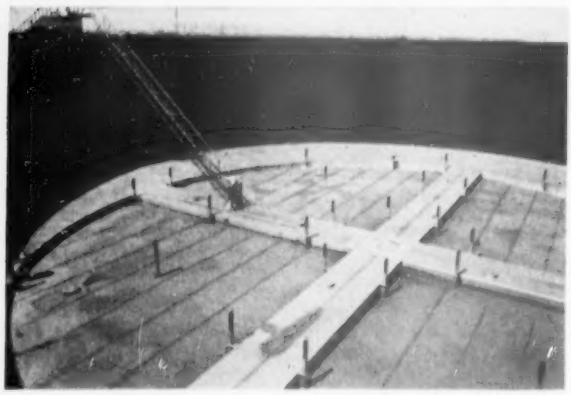


PAN-TYPE FLOATING ROOF

Used widely for sour-crude storage. Single-deck construction slopes to center for easy drainage and to prevent corrosive vapors from contacting the underside of plate. Stiffening framing members are on underside of deck plating, leaving deck free of obstructions and keeping maintenance costs low.

DOUBLE-DECK FLOATING ROOF

Ideal for storing gasoline and various refined products. The roof has two layers of steel plate, separated by inert air space. The high degree of insulation provided by this "dead" air protects the quality of the stored product and prevents loss through evaporation.



PONTOON-TYPE FLOATING ROOF

Designed especially for gasoline and refined-products storage. Both annular and radial pontoons provide buoyancy to float roof under heavy snow loads. Top of deck slopes toward center for drainage. Water can be carried between roof pontoons for insulation.

Bethlehem Designs and Builds

Cone-Roof Tanks	Floating-Roof Tanks
Dome-Roof Tanks	Pressure Vessels
Umbrella-Roof Tanks	Gas Holders
Lifter-Roof Tanks	Propane Tanks

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

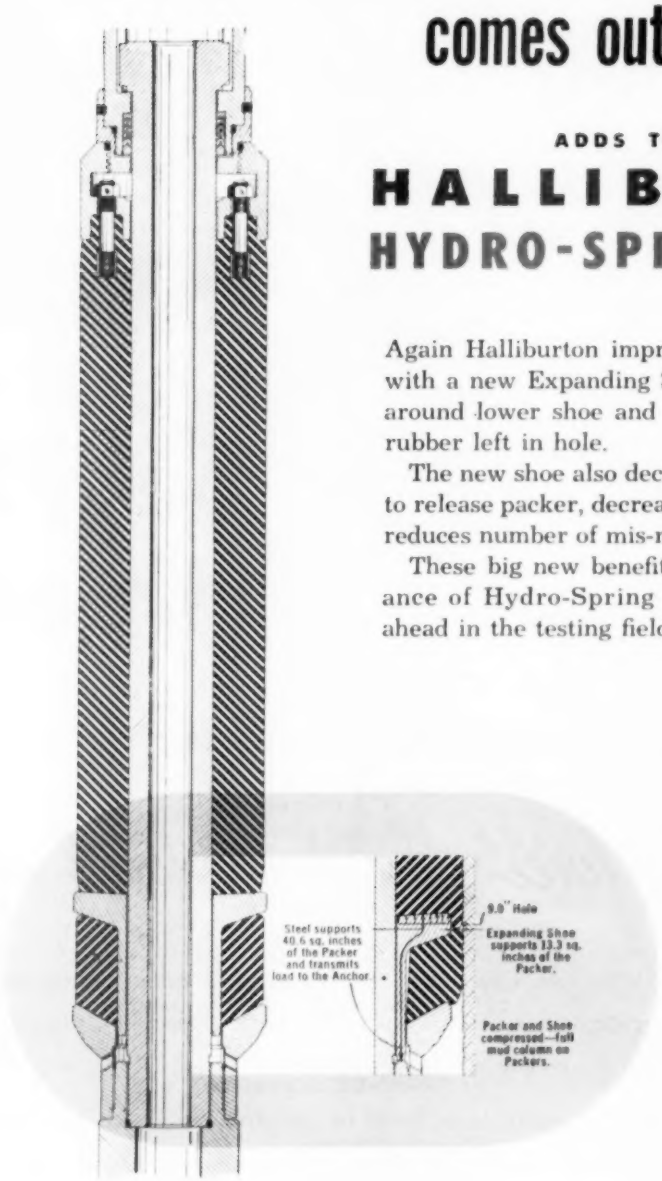
BETHLEHEM STEEL

NEW EXPANDING SHOE PACKER

comes out of hole intact...

ADDS TO BIG ADVANTAGES OF

HALLIBURTON'S HYDRO-SPRING TESTER


Steel supports 40.6 sq. inches of the Packer and transmits load to the Anchor.
9.0" Hole
Expanding Shoe supports 13.3 sq. inches of the Packer.
Packer and Shoe compressed—full mud column on Packers.

Again Halliburton improves its Testing Service... this time with a new Expanding Shoe Packer that prevents extrusion around lower shoe and reduces considerably the amount of rubber left in hole.

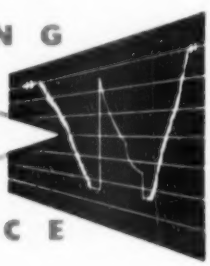
The new shoe also decreases the pulling and jarring needed to release packer, decreases amount of drag going in hole, and reduces number of mis-runs in over-sized holes.

These big new benefits added to the remarkable performance of Hydro-Spring Tester make Halliburton fourbles ahead in the testing field. Operators everywhere find Hydro-Spring features add up to substantial savings in time, trouble, money. Now additional savings can be made at no extra cost by Halliburton's new Expanding Shoe Packer that leaves less rubber to be drilled out of hole.

Your drill stem test is mighty important, often determines the success of exploration or development drilling. Make sure you get the most modern test, the most accurate and complete data available... Halliburton's Testing Service. It costs no more. So phone your local or district Halliburton office, just minutes away, or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

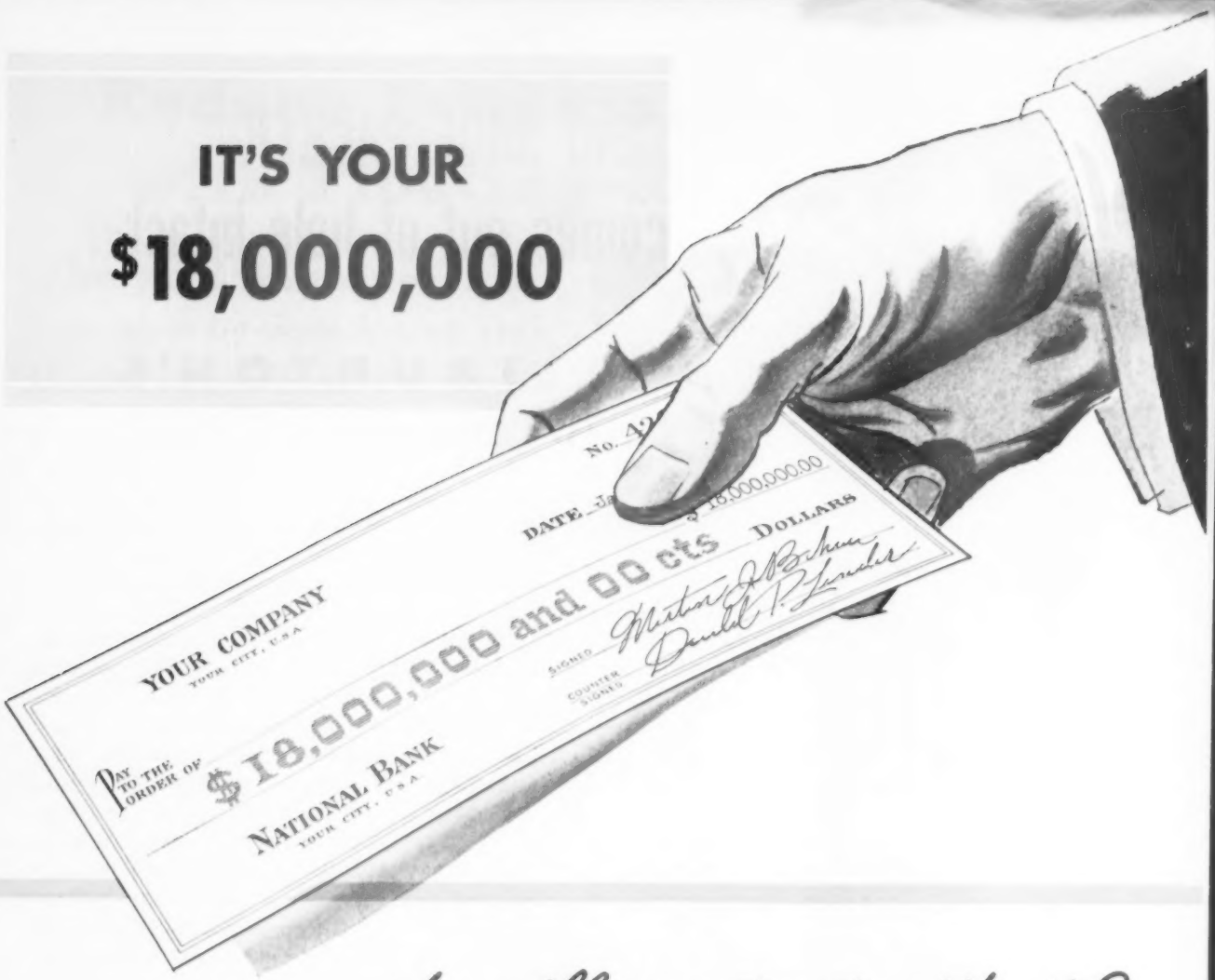
Hydro-Spring Tester — Patent Applied For

TESTING **HALLIBURTON** SERVICE



HALLIBURTON'S BEST FOR YOUR DRILL STEM TEST

IT'S YOUR $18,000,000



... who will you trust with it?

WHEN your company invests that kind of money in new plant construction you will have to have confidence—a lot of confidence—in the people you trust with the job.

You can find plenty of evidence of complete confidence in McKee among some of the world's largest corporations in the industries we serve. Most of the big names in these industries have called on us again and again for McKee design, engineering and construction services . . . the type of sound thorough efficient services you want for *your* money.

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S/V Sovabeads Increase Dehydrator Efficiency Almost 100%

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S/V Sovabeads provide a longer desiccant bed life. They eliminate caking . . . reduce channeling, dusting and pressure drops. Reactivation is quick, easy and economical.

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. . . process products

Process Products

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How J&L tailor-assembles Axelson pumps

Any well will loaf — will fail to do its dead-level best — unless equipped with *precisely the right pump.*

The AXELSON Sure-Seal, stationary barrel with Top-Cup Hold-Down, may be exactly the right pump to wake up that loafer you have in mind. It does keep thousands of wells on their toes. It's a real work horse — a metal-to-metal pump with no cups to cut out.

Top-Cup Hold-Down

The Sure-Seal is a versatile pump, with a wide range of alternate parts and accessories. Your well may call for special barrel tubes hardened by a patented Axelson process, or Axelson Heavy-Duty Cages, or other special equipment. In assembling a Sure-Seal Pump for any given well, all alternate equipment is carefully considered by experienced J&L men.

Your J&L store will give you sound advice . . . will recommend the Axelson Pump that is basically right for your well, and will tailor-assemble that pump to yield the most oil for the least money.

No well should loaf. Call that J&L number now!

Sure-Seal is a registered Trade Mark of the Axelson Manufacturing Company.

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General Offices: TULSA, OKLAHOMA
J&L Tubular Products and Wire Rope

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And "Scotchrap" *lasts*. It protects pipe above ground from weathering, snow, rain and corrosive atmosphere just as it protects buried pipe from galvanic and electrolytic action, earth acids, alkalies and oil.

Order a trial supply today! "Scotchrap" is sold by the square in 1", 2", 4", 6" and 8" widths. Two thicknesses: 10 and 20 mils. For more information, write Minnesota Mining and Manufacturing Co., Dept. OG-24, St. Paul 6, Minnesota.

3M COMPANY

The term "Scotch" and the plaid design are registered trademarks for the more than 300 pressure-sensitive adhesive tapes made in U.S.A. by **Minnesota Mining and Manufacturing Co., St. Paul 6, Minn.**—also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: 122 E. 42nd St., New York 17, N. Y. In Canada: London, Ont., Can.

Look what AUTOCAR offers for '54!

★ 31 MODELS

★ 8 ENGINES
Gasoline and Diesel

★ 19 TRANSMISSIONS

★ 7 AUXILIARY TRANSMISSIONS

★ 14 REAR AXLES

★ 2 NEW LIGHTWEIGHT WEST COAST MODELS

★ NEW ALL-ALUMINUM DRIVER CAB

Fill out the coupon below and learn more about Autocar tractors, trucks, dump trucks, and tandem units.

Autocar Division of The White Motor Company, Ardmore, Pa.
I would like to hear more about Autocar for '54.

Name .....

Company Name .....

Address .....

Type of Operation ..... **No. of trucks in fleet** .....

198

AUTOCAR TRUCKS

Autocar Division of The White Motor Co.
Ardmore, Pa.

Export: Drexel Building,
Philadelphia 6, Pa., U.S.A.

•

Factory Branches and Distributors from Coast to Coast in the United States and Canada

Carter

—LONG-STROKE HYDRAULIC PUMPING UNITS—

- *Designed-*
- *Built-*
- *Priced-*

FOR STRIPPER WELLS

featuring the LONG, LOW UPSTROKE and VARIABLE CYCLE which provide increased production – reduced Sanding Up – greater overall efficiency – longer life and low maintenance costs!

Increased production – both immediate and ultimate.

Sanding up eliminated, or greatly reduced.

Gas lock eliminated.

Higher volumetric efficiency in working barrel.

Maximum production without pumping off or pounding fluid.

Less wear and failure of all parts, such as rods, tubing, pumps, balls, seats.

Qualified representatives for sales and service are located at convenient points throughout the oil country.

Easily maintained by regular field personnel, because of extreme simplicity and practicability of design and construction.

No concrete foundation is usually necessary.

Quick and easy set-up. Some machines are being used as portable test units.

The present perfected models have been in use by both majors and independents for more than seven years.

Low first cost. Prices competitive with conventional mechanical equipment.

Prompt delivery at present.

MORE THAN 700 UNITS NOW IN SERVICE!

MORE THAN SEVEN YEARS OF FIELD EXPERIENCE!

Write FOR BULLETIN PR-253

S. C. CARTER COMPANY, inc.

1900 Santa Fe Avenue • Los Angeles, California

Sales and Service Representatives in –

CALIFORNIA – Los Angeles • KANSAS – Chase, El Dorado, Great Bend
KENTUCKY – Irvine, Oil Springs, Owensboro • ILLINOIS – Robinson, Salem • INDIANA – Princeton, Evansville • MICHIGAN – Mt. Pleasant
MONTANA – Conrad, Cut Bank • OHIO – Wooster, Zanesville • OKLAHOMA – Healdton • TEXAS – Alice, Barbers Hill, Bay City, Beaumont, Borger, Columbus, Corpus Christi, Dallas, Houston, Liberty, Odessa, Pampa, Victoria • WEST VIRGINIA – Vienna • WYOMING – Casper.

Export: Edmonton • Caracas • Maracaibo • Puerto La Cruz
Port of Spain

BIG OUTPUT

...BUT LESS WORK FOR THE OPERATOR!

All the operating features needed for effective, high speed drilling are built into Bucyrus-Erie spudders. Simplified controls make them easy to run at top speed. With all operating levers conveniently grouped on one corner of the frame, only a short "reach distance" separates the driller from the job at all times. Check these four outstanding features of Bucyrus-Erie's simplified control system:

TWO FORWARD SPEEDS

— and one reverse for all drums and catheads (except 60-L, which has one forward and one reverse speed). Extra speed provides slow, high-power action for extra safe handling.

INTERCONNECTED LEVERS

— Two speed hoist (on all models except 60-L) is controlled by individual hand levers interconnected to change speed instantly without stopping. Shifting is done with only one hand.

CAM CONTROLLED SPEED

— To accelerate speed as needed, a sensitive positive cam is provided to adjust the engine throttle.

AUTOMATIC LINE FEED

— An adjustable latch bar on the bull reel brake lever allows automatic release of line as drill bit cuts deeper into the hole.

Easy operation is just one of many Bucyrus-Erie spudder advantages. Get full details from your nearby distributor. 9553

FOUR MODELS TO CHOOSE FROM

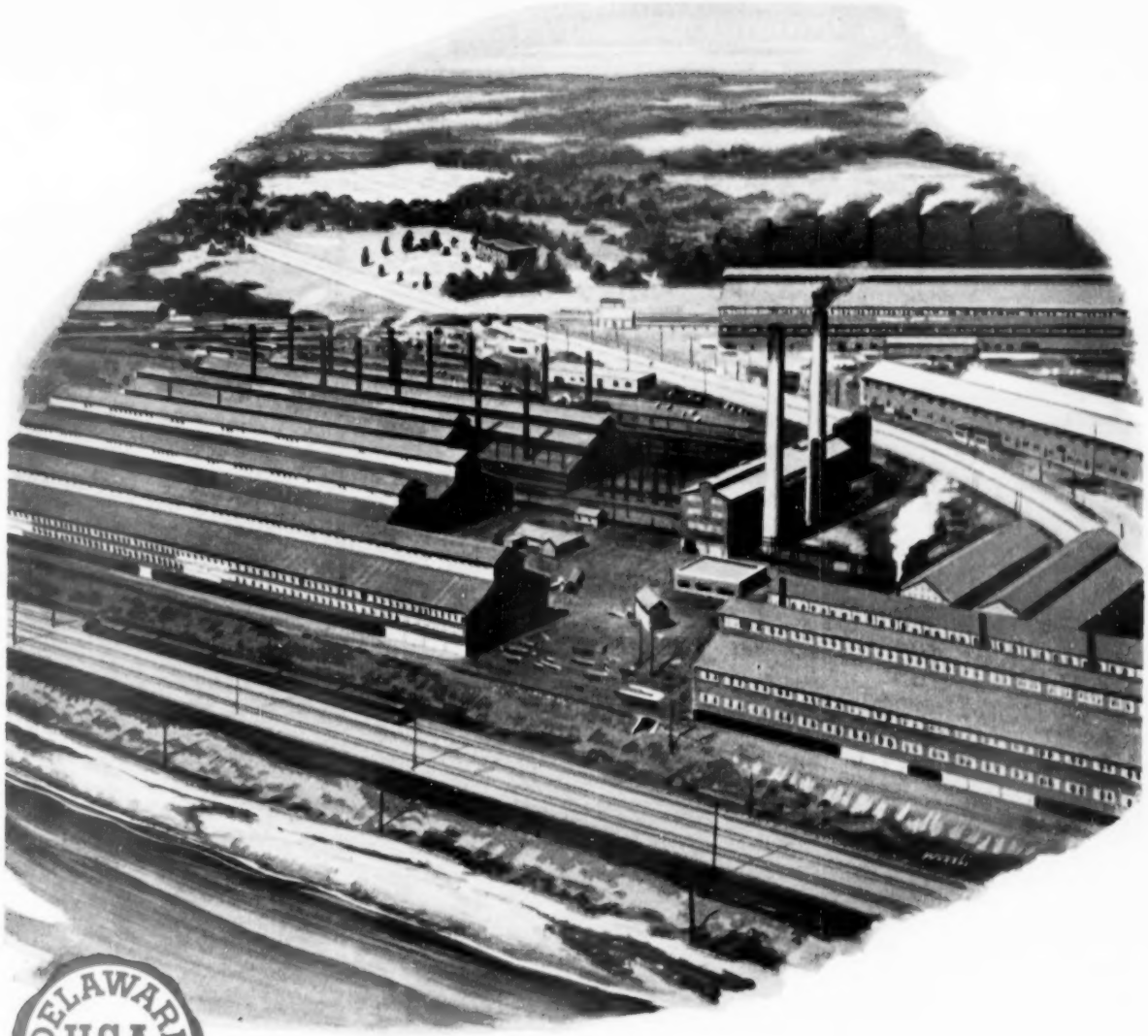
60-L · 28-L · 36-L · 48-L

Maximum drilling depth 6000 feet; servicing 7000 feet.

BUCYRUS ERIE

South Milwaukee
Wisconsin

FIRST with the FINEST in Spudders!



DELAWARE U·S·A VALLEY

America's fastest growing industrial area

HOME OF CLAYMONT STEEL

Here at Claymont, in the fast-expanding industrial empire on the Delaware River, are the open hearths, rolling mills, flanging shops, and pipe mill that turn out a wide variety of Claymont Products.

These include Alloy and Carbon Steel Plates . . . Stainless-Clad Plates . . . Flanged and Dished Heads . . . Manhole Fittings and Covers . . . and Large Diameter Welded Steel Pipe for transmission of oil, gas or water.

In our Claymont plant all of these products are under complete quality control starting with the making of steel in our own open hearth furnaces and continuing through every step of manufacture.

1981

CLAYMONT STEEL

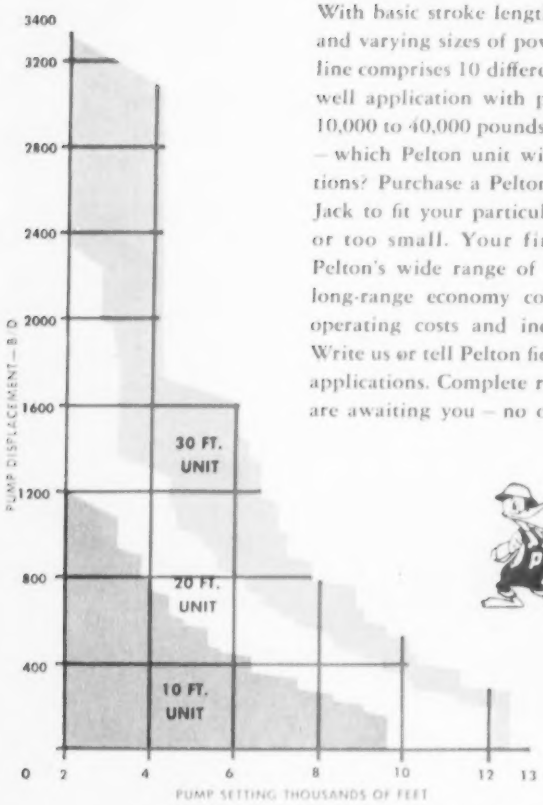
WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION
CLAYMONT, DELAWARE

CF&I

10 PELTON MODELS OFFER YOU WIDER SELECTION – ECONOMY

HYDRAULIC LONG STROKE PUMPING JACKS

With basic stroke lengths of 10, 20 and 30 feet and varying sizes of power cylinders, the Pelton line comprises 10 different models to handle any well application with polished rod loads from 10,000 to 40,000 pounds. Try the Selection Chart – which Pelton unit will suit your well conditions? Purchase a Pelton Long Stroke Pumping Jack to fit your particular need – not too large or too small. Your first economy comes in Pelton's wide range of sizes. Your second and long-range economy comes in vastly reduced operating costs and increased oil production. Write us or tell Pelton field men about your well applications. Complete recommendations, prices are awaiting you – no obligation whatever.



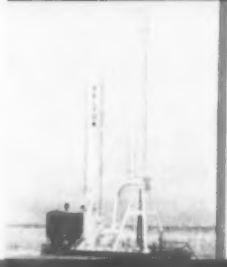
HOW TO USE THE SELECTION CHART

EXAMPLE: Well depth 8000 feet. Desired pump displacement 500 B/D. A Pelton 20-foot stroke unit will do the job. THE ABOVE SELECTION CHART BASED ON:

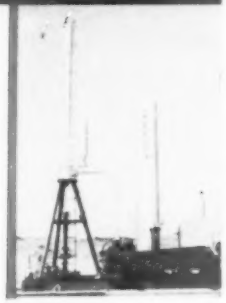
1. Fluid – all water
2. Fluid at pump
3. Tubing anchored
4. Limit of 40,000 PSI stress in sucker rods
5. Maximum sucker rod size 1"

PELTON is the leading manufacturer of Hydraulic Long Stroke Pumping Equipment.

Series HP 30 Ft. Stroke Jack



Series GP
20 Ft. Stroke Jack



Series FP
10 Ft.
Stroke Jack

PELTON
WATER WHEEL COMPANY
Subsidiary of Baldwin-Lima-Hamilton Corp.
Oil Industry Machinery Division
2447 East 54th Street, Los Angeles 58, California
San Francisco · Denver · Tulsa · Houston · Dallas · Tyler · New York City

BEAIRD-INGERSOLL-RAND

Packaged Compressor Plant

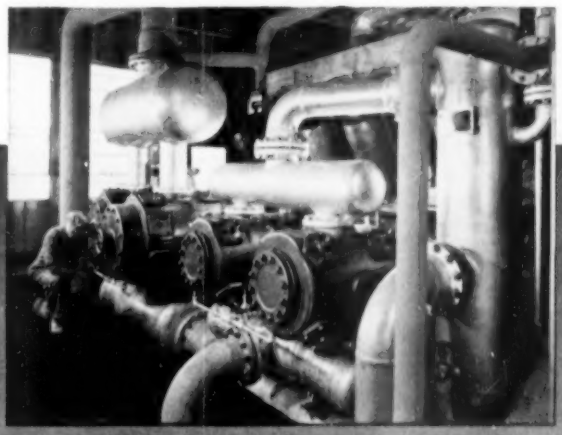
Lowest Cost Per Horsepower Installed

THE PEOPLES NATURAL GAS COMPANY, of Pittsburgh, Pennsylvania, had the problem of obtaining rapid recovery of its native reserve of natural gas from a portion of an underground storage pool near Jeannette, Pa. The area had been taken over by an affiliated company, New York State Natural Gas Corp., for the development of Oakford pool, and it had been agreed that Peoples Natural Gas Co. could produce the remainder of the gas still in place before storage operations became too far advanced. They installed three 550 horsepower Beaird-Ingersoll-Rand packaged compressor plants near Jeannette, Pa. which pump gas out of the original producing formations into distribution lines. Each unit has two stages of compression with interstage scrubbers and interstage gas cooling as well as all necessary manifolds, piping, lubrication and cooling systems. All of these three plants were fully assembled at the Beaird plant on rugged steel bases and shipped as complete units. Their complete packaging reduced installation time at the location and took advantage of lower assembly costs at the factory.

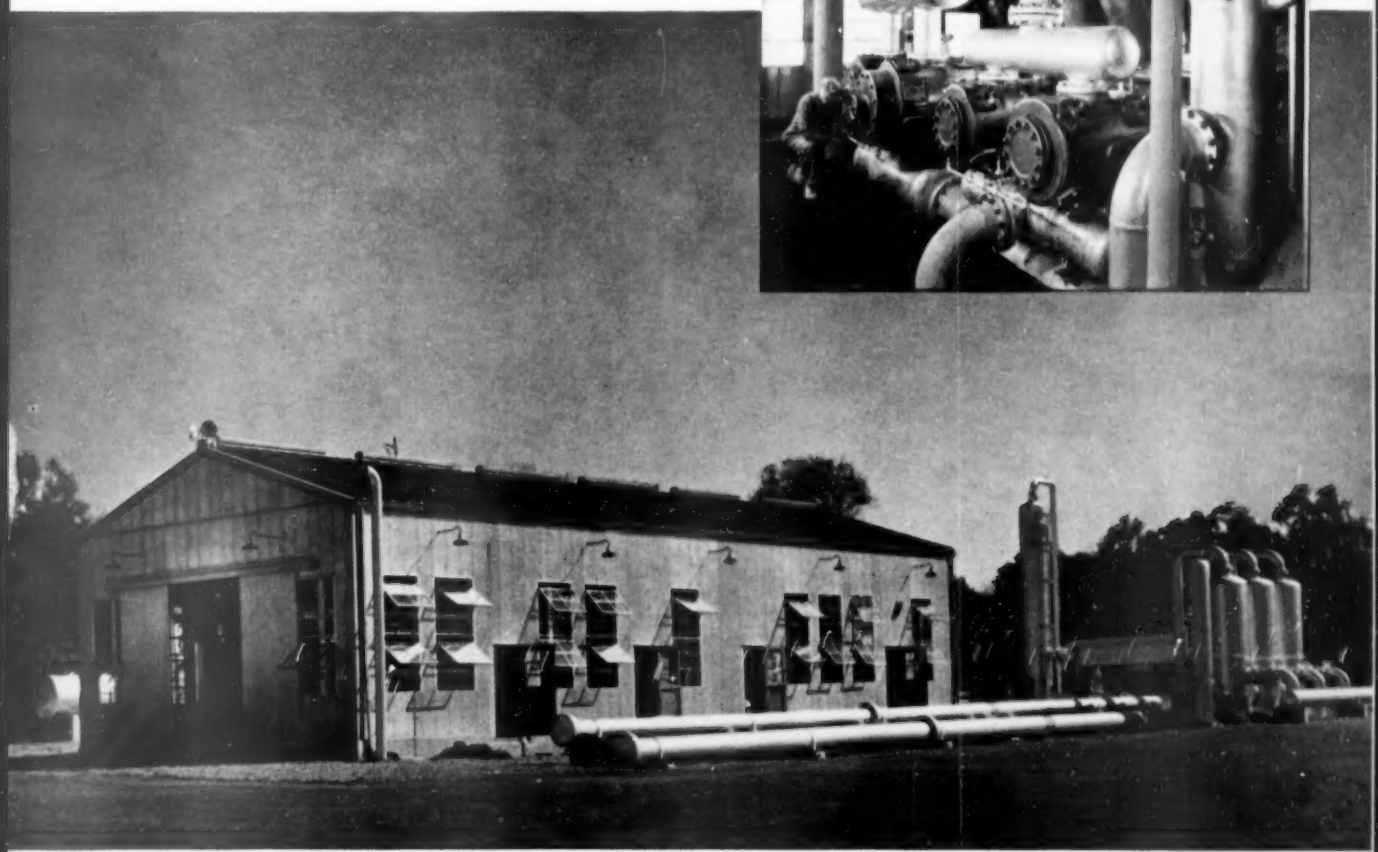
Let us give you the actual facts on lower installation costs of Beaird-Ingersoll-Rand packaged compressor plants.

Three 550 h.p. units —

RECOVER RESERVE FROM UNDERGROUND GAS STORAGE POOL



These three Beaird-Ingersoll-Rand packaged compressor plants are complete with Ingersoll-Rand 550 horsepower 10SVG engine driven compressors, Young radiators and all other necessary components and controls. Made in sizes from 110 h.p. to 550 h.p.



THE J. B. BEAIRD COMPANY, INC.

Shreveport, Louisiana

BEAIRD

MACHINING MANUFACTURING STEEL WAREHOUSE

PACKAGED COMPRESSOR PLANTS

CAST STEEL FITTINGS

PRESSURE BULK STORAGE

ANHYDROUS AMMONIA EQUIPMENT

LP GAS SYSTEMS

BEAIRD ***Cast Steel Fittings***

Fittings that fit

FITTINGS *IN A HURRY*

Need fittings in a hurry? Want to be sure of meeting your deadlines? Have to meet an emergency with minimum down time? Then ask your supply house...or call us direct...for immediate shipment of Beaird fittings from our large stock of standard sizes. Save time in ordering by using the convenient selection charts and figure numbers in our new catalog No. 153. We can also give you prompt delivery on special fittings from our wide assortment of patterns.

Write for Catalog 153 and let us put your name on our mailing list for current stock lists.

THE J. B. BEAIRD COMPANY, INC. SHREVEPORT, LOUISIANA

BEAIRD

MACHINING MANUFACTURING STEEL WAREHOUSE

PACKAGED COMPRESSOR PLANTS

CAST STEEL FITTINGS

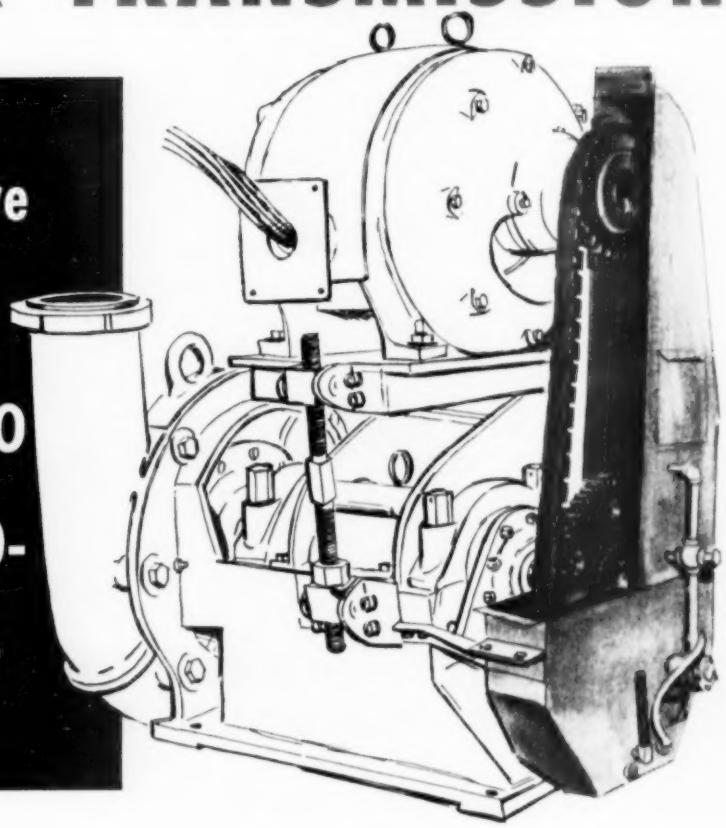
PRESSURE BULK STORAGE

ANHYDROUS AMMONIA EQUIPMENT

LP GAS SYSTEMS

HY-VO facts for a new age in POWER TRANSMISSION

How you can save up to $1,407.00 with MORSE HY-VO on a 350-hp., 1800-rpm electric motor



Now, with Morse Hy-Vo Drives, you can gain new advantages from buying smaller, higher speed, more efficient electric motors.

You save weight, space, and electric power. And in most cases, the difference in cost between a low-rpm motor and a high-rpm motor of the needed horsepower, will more than pay for the Hy-Vo Drive. Let's look at an example:

Generally, the commonly used methods of power transmission, due to inherent restrictions on rotative speed and velocity, limit the speed of 200-hp. or larger motors to 1200 rpm. Hy-Vo's upper limits are far greater, ranging up to 3600 rpm for ¾" pitch.

Suppose you needed a 350-hp. motor. According to the catalog base price of one prominent motor manufacturer, a 1200-rpm, 350-hp. motor costs $13,709. But an 1800-rpm, 350-hp. motor costs only $12,302. You save up to $1,407. Also, your higher rpm motor would weigh 200 pounds less.

And with a narrow Hy-Vo, it's very likely you'd do away with the cost of outboard bearings and mountings. Bonus savings!

Write us for detailed information on the savings Hy-Vo will bring in your electric-motor applications, or of the comparable savings Hy-Vo can make, because of its high rotative and velocity limits, on your internal combustion engine applications.

MORSE CHAIN COMPANY

7601 Central Avenue • **Detroit 10, Michigan**

SOME DESIGN FACTORS BEHIND HY-VO'S SUCCESS...

Hy-Vo's many design and manufacturing refinements result in a drive with unusual power-transmitting capacity. Note involute tooth design of Hy-Vo Sprockets . . .

. . . and the new, Hy-Vo Compensating Rolling Joint, which always shifts the pitch line automatically as the Hy-Vo Chain engages the involute teeth of the sprocket.

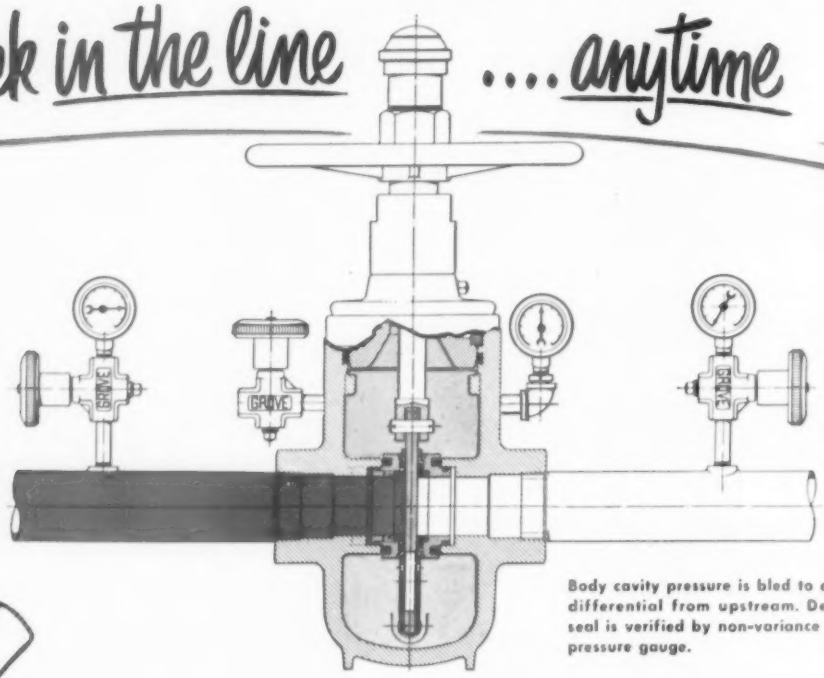
Chain follows a path truly tangent to sprocket pitch circle, thus almost eliminating chordal action. A new, balanced link design greatly improves stress distribution.

MORSE BW

MECHANICAL POWER TRANSMISSION PRODUCTS

The only GATE VALVE you can

Check in the line .... anytime



Body cavity pressure is bled to a specific differential from upstream. Dead-tight seal is verified by non-variance of cavity pressure gauge.

1...FOR POSITIVE DEAD-TIGHT SEAL
2...FOR FREE-MOVING GATE ACTION

FULLY AUTOMATIC INTERNAL RELIEF OF EXCESS BODY PRESSURE TO UPSTREAM

Grove Seal-"O"-Ring Gate Valves provide a positive fool-proof method of checking dead-tight seal and free-moving gate action *in the line,* at any time. Just three pressure gauges...on the upstream, on body cavity, and on downstream line tell the full story. Over a full turn of the handwheel without breaking the seal checks the freedom of the gate without opening the valve. Piston action of Seal-"O"-Ring valve seat assemblies, actuated by pressure differential provides automatic internal relief of excess body pressure to upstream line. Grove Seal-"O"-Ring Gate Valves hold tight as a line blind, yet allow free movement of gate at all times. These facts can be demonstrated, tested and proved to your complete satisfaction. To arrange for test, write today.

See this test for yourself!

We will gladly arrange to make this conclusive test for you and any group in your organization or area at a time and place, most convenient.

GROVE SEAL-"O"-RING Gate Valves

GROVE REGULATOR COMPANY • 65th & Hollis Sts., Oakland 8, California
HOUSTON 4—1901 Calumet St. • **LOS ANGELES 14**—649 So. Olive St. • **NEW YORK 17**—415 Lexington Ave.

GROVE
SIMPLICITY
ACCURACY
SAFETY

CORPUS CHRISTI, TEXAS	ODESSA, TEXAS	DALLAS, TEXAS	TULSA, OKLAHOMA	LAFAYETTE, LOUISIANA	DENVER, COLORADO
4534 No. Baldwin Blvd.	2604 Kermit Highway	1334 Fidelity Union Life Bldg.	318 Thompson Bldg.	101 Berkeley Street	2669 Cherry Street

Keeping Thermal Expansion Under Control

Flexible support for piping in all positions of travel must be provided, if destructive stresses and strains are to be avoided in today's high temperature piping systems.

Heat 100 linear feet of alloy steel pipe to 1000°F, and it will expand 9.1 inches! When this thermal expansion takes place in a piping system, the resultant forces induced, if uncontrolled, can do incalculable harm.

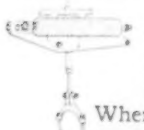
Helical coil springs

The practice of using helical coil springs to allow this thermal expansion to occur is quite general. But the care that goes into the design or selection of flexible supports ofttimes is haphazard. In fact, many specifications covering the support of important high temperature piping will simply say "spring hangers shall be provided". Merely to contend that this may be dangerous is not enough.

Safety of entire system at stake

Unless careful study is given to the design and selection of spring supports which will maintain a balanced pipe system, the transfer of weight from one hanger to another, or from a hanger to a terminal point, will endanger the safety factor of the entire system.

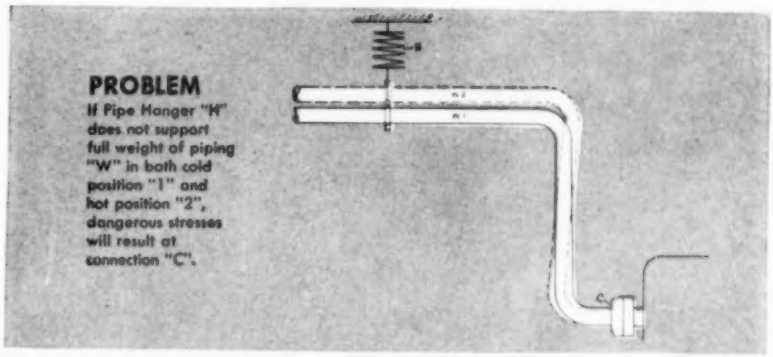
With 8 . . . 9 . . . even 10 inches of thermal deflection not a bit uncommon today, completely flexible support for piping in all positions of travel is a positive "must".

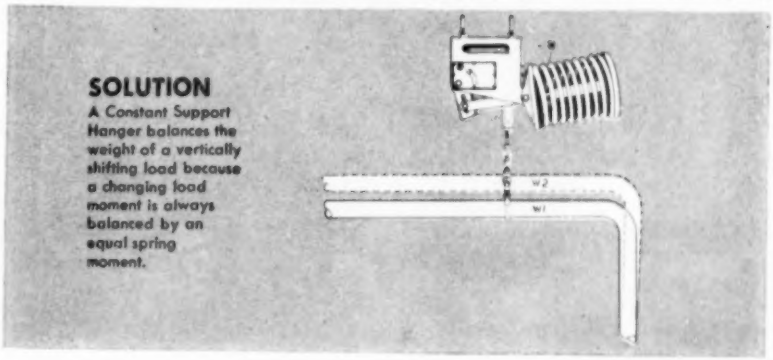


The case for constant-support hangers

Where reactive forces at terminal points in a piping system must be kept within specified limits, constant support type hangers are recommended.

They are designed to provide uniform supporting force equal to the pipe load throughout the travel range and should be used at superheater outlets, turbine connections, and also on high temperature and other critical lines.


PROBLEM
If Pipe Hanger "H" does not support full weight of piping "W" in both cold position "1" and hot position "2", dangerous stresses will result at connection "C".


SOLUTION
A Constant Support Hanger balances the weight of a vertically shifting load because a changing load moment is always balanced by an equal spring moment.

Variable spring hangers

When pipe lines are subject to vertical movement, and restrictive conditions do not require a constant-support type hanger, variable spring hangers are recommended. They should be designed to support not less than 85%, or more than 120%, of the design load throughout the total travel.

Vibration control and sway brace

When necessary to prevent abnormal movement or vibration in pipe lines, controls or sway braces of the energy-absorbing or instant-acting counter force type, are recommended. They dampen vibration, oppose pipe sway and absorb shock.

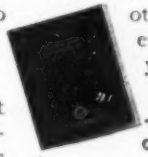
Hanger Engineering Service

The Pipe Suspension Department of Grinnell Company offers a design service to engineering firms which appreciate the specialized knowledge required to compute hanger loads and to select the proper supports for a balanced pipe suspension system when high pressures and high temperatures are involved.

Grinnell manufactures a complete line of pipe hangers and supports; maintains an experienced laboratory staff of technicians to discover better ways of solving pipe suspension problems; provides engineering assistance in design and installation; offers stocks of pipe hangers close to any job.

Hanger load calculation booklet

A 28-page booklet entitled "Hange Load Calculations", compiled to furnish necessary data and procedure to determine pipe hanger loads, can be obtained from Grinnell Company. The tabulations of piping weights and thermal expansion have been arranged for convenient selection of data that otherwise consume considerable time to develop. It's yours without obligation.



GRINNELL COMPANY, INC.

256 West Exchange St., Providence, Rhode Island

Kindly send me a complimentary copy of your "Hanger Load Calculations" booklet.

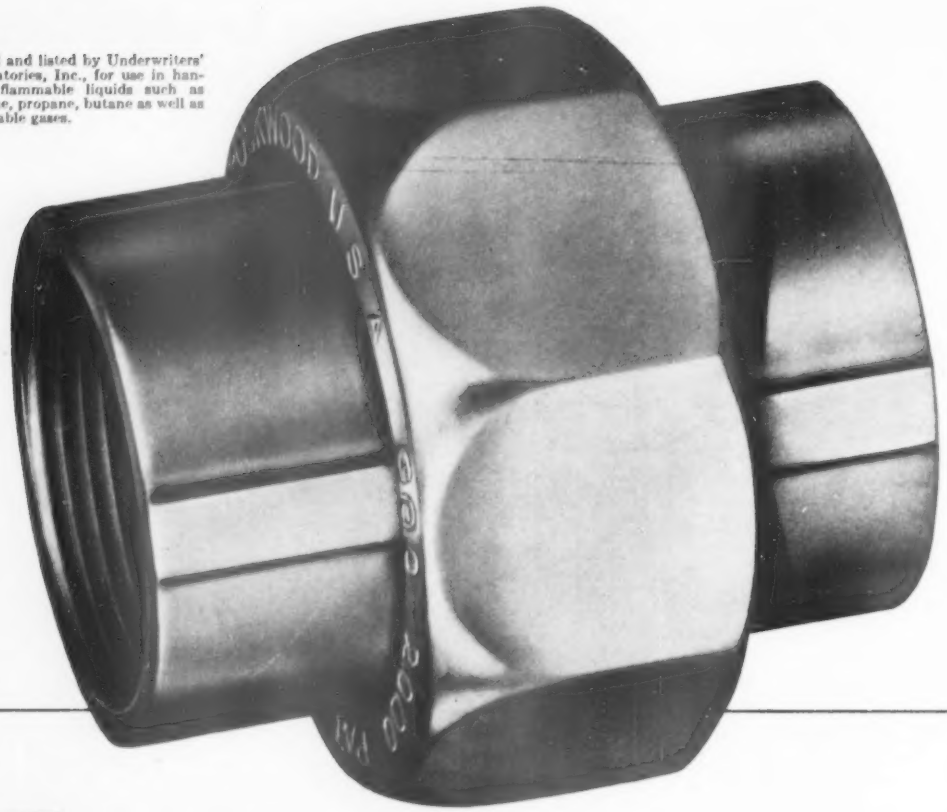
Name .....

Company .....

Address .....

City ..... State .....

Tested and listed by Underwriters' Laboratories, Inc., for use in handling flammable liquids such as gasoline, propane, butane as well as flammable gases.



FORGET ABOUT CORROSION!

Rockwood Union seats are made of stainless steel or Moly 431 ... thanks to cold-forging

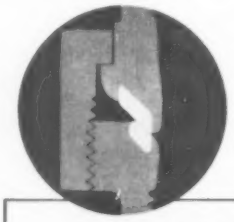
Yes. Rockwood cold-forged steel Unions are corrosion-proof. No more worries about corrosion at seat joint.

And that's not all —

The non-corrosive seats are double-locked in place, under 100,000 and 400,000 lb. pressure. They can't work loose because they're an integral part of the Union. And their plug type ball-to-cone design has no sharp corners or knife-like edges. Piping misalignment is done away with.

The new, over-all balanced design of Rockwood Unions gives all three parts equal strength. You get higher resistance to tough working conditions — expansion and construction-shock — jar and vibration. Absolute interchangeability of parts for speedy replacement.

All Rockwood Unions are "Rockwoodized" against corrosion — a special coating process. For details on the complete line, write Rockwood Sprinkler Company, 104 Harlow Street, Worcester 5, Mass.



Special Non-Corrosive Seat Construction gives Rockwood Unions superiority. Specify Rockwood Type 602 Union with two Stainless Steel seats — or Rockwood Type 603 Union with two Moly 431 seats.

ROCKWOOD

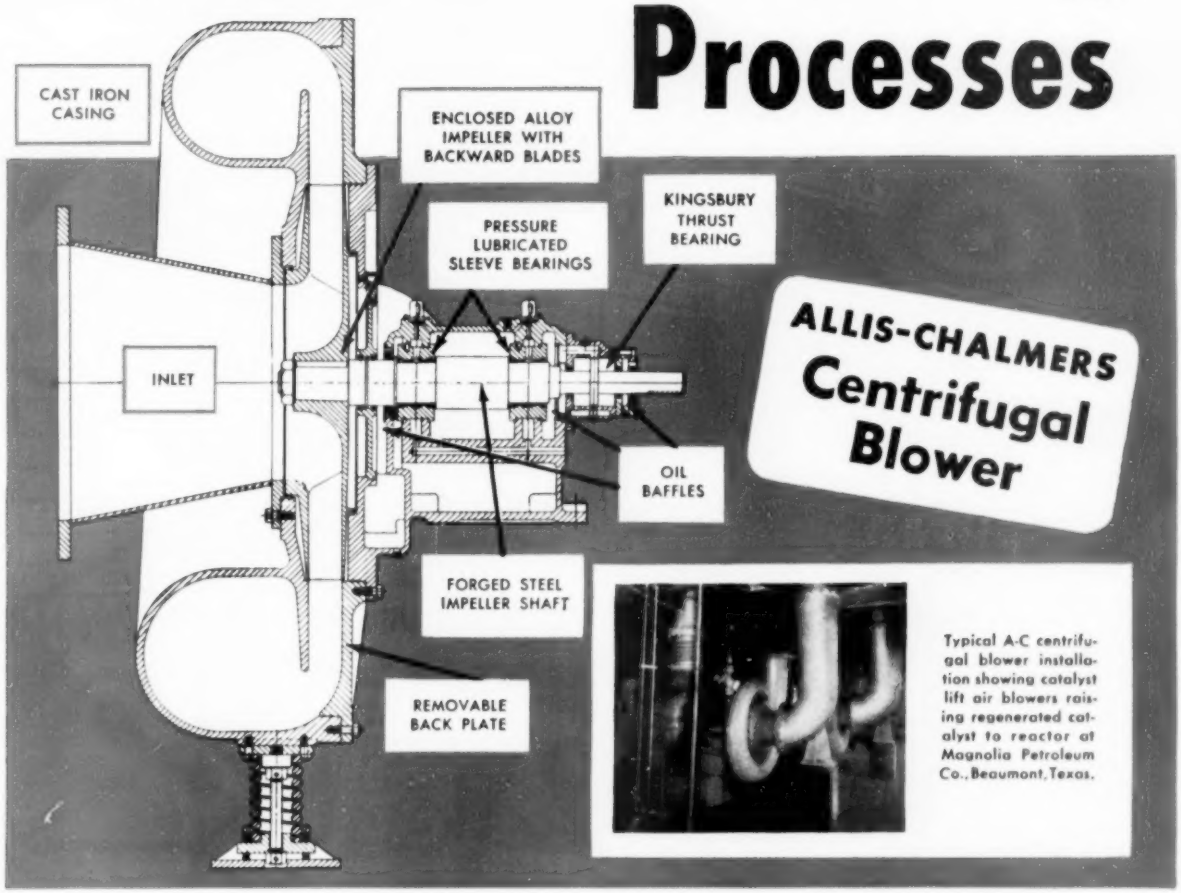
ROCKWOOD

SPRINKLER COMPANY

MANUFACTURERS OF THE MOST COMPLETE LINE OF STEEL UNIONS ON THE MARKET

WORCESTER 5, MASSACHUSETTS

Air for New Cracking Processes



Typical A-C centrifugal blower installation showing catalyst lift air blowers raising regenerated catalyst to reactor at Magnolia Petroleum Co., Beaumont, Texas.

To meet this nation's ever-increasing demands for premium and aviation gasolines, more efficient cracking methods are being devised. Allis-Chalmers centrifugal blowers are a vital part of these new fluid processes.

At refinery after refinery, Allis-Chalmers units are withstanding the requirements of continuous operation . . . providing maximum dependability under every condition.

The cross-section drawing above shows some of the outstanding features of a typical Allis-Chalmers blower. The totally enclosed, all-welded alloy steel impeller offers highest efficiency, and backward flow design provides outstanding pressure and volume characteristics.

High strength and long life are assured by all-welded alloy steel impeller construction and pressure lubricated sleeve and thrust bearings. Cast iron casing increases rigidity and decreases noise level.

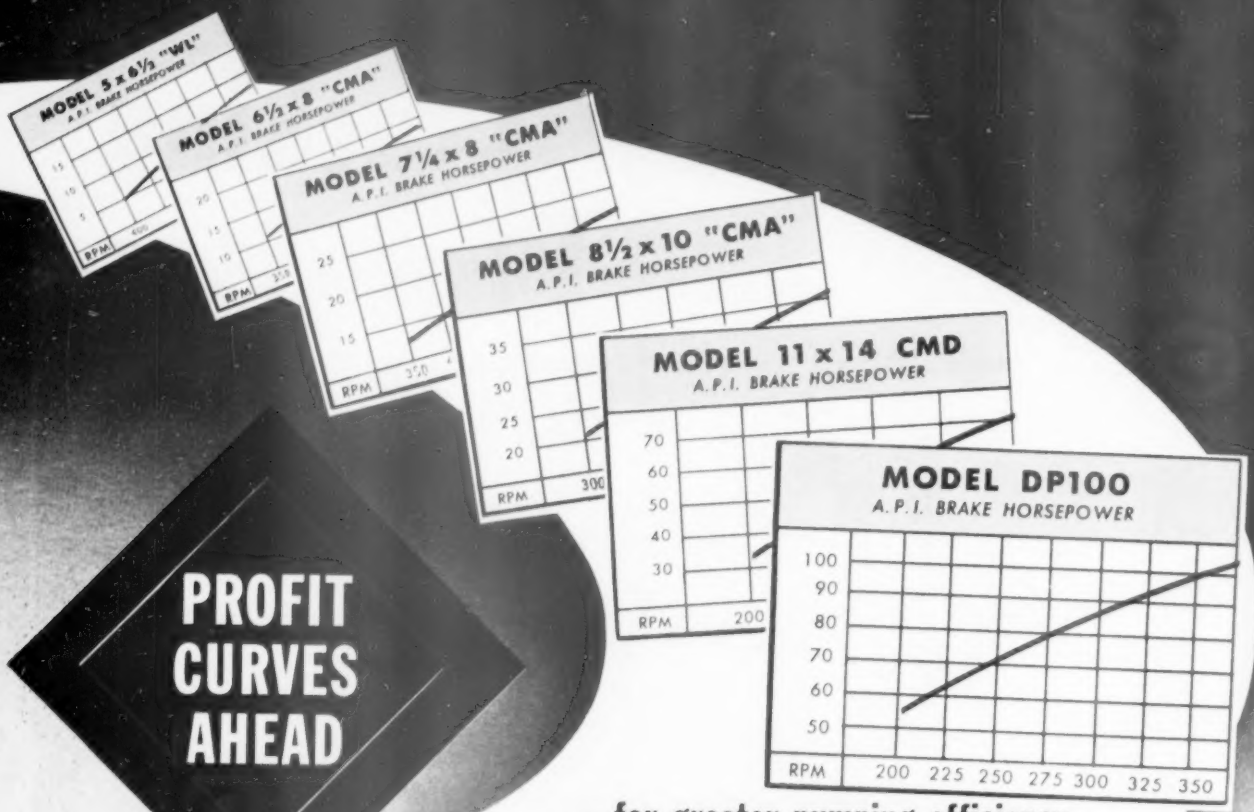
You can benefit from Allis-Chalmers wide experience in building and applying blowing equipment in the petroleum industry. For detailed information call your nearest A-C sales office, or write Allis-Chalmers, Milwaukee 1, Wis.

A-4234

ALLIS-CHALMERS

Texrope is an Allis-Chalmers trademark.

Power, Electrical, Processing Equipment for Petroleum Industry



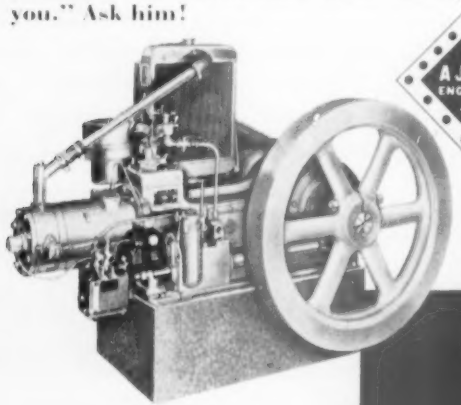
PROFIT CURVES AHEAD

—for greater pumping efficiency at lower pumping costs!

Ajax

GAS AND OIL ENGINES

The horsepower curve of each engine in the complete AJAX line tells its own action story to the experienced oil man! Engine for engine, size for size, it's AJAX for top power and economy. Your Supply Man will be glad to produce "the curves that make money for you." Ask him!



The complete line —

5 to 105

A.P.I. HORSEPOWER

AJAX IRON WORKS

Builders of GAS AND OIL ENGINES, PRESSURE PUMPS, STEAM DRILLING ENGINES, INDUSTRIAL STEAM ENGINES

CORRY, PENNSYLVANIA

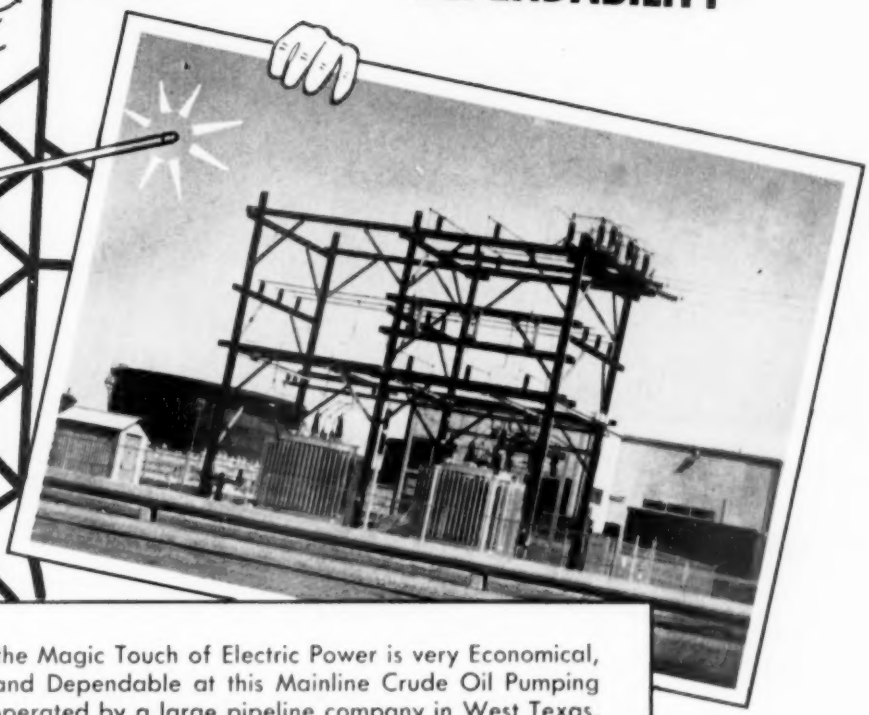
Oil Field Distributors: THE NATIONAL SUPPLY CO. PITTSBURGH, PA.
R. B. MOORE SUPPLY CO., BOLIVAR, N.Y. • BETHLEHEM SUPPLY CO., TULSA, OKLAHOMA

The Magic Touch of

Electric Power

MEANS

ECONOMY, EFFICIENCY, DEPENDABILITY



Yes, the Magic Touch of Electric Power is very Economical, Efficient and Dependable at this Mainline Crude Oil Pumping Station, operated by a large pipeline company in West Texas. In this station are three 3,000 H.P. and one 1,250 H.P. motors with over eighty Electrically operated valves. You can readily see that Low Cost Purchased Electric Power is doing a real job with its "Magic Touch." For the BEST ALL-AROUND POWER PERFORMANCE . . . SWITCH to Low Cost Purchased Electric Power . . . TODAY! For full details call your nearest Electric Power Company.

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ORGANIZED IN THE INTEREST OF GREATER SERVICE TO THE PETROLEUM INDUSTRY

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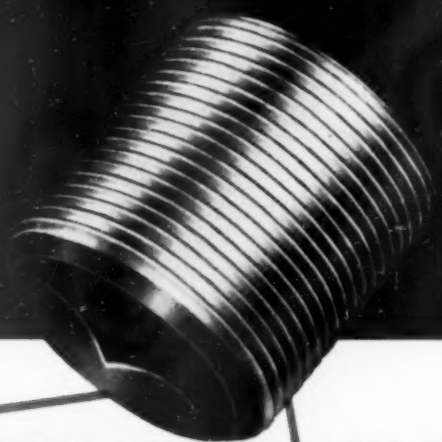

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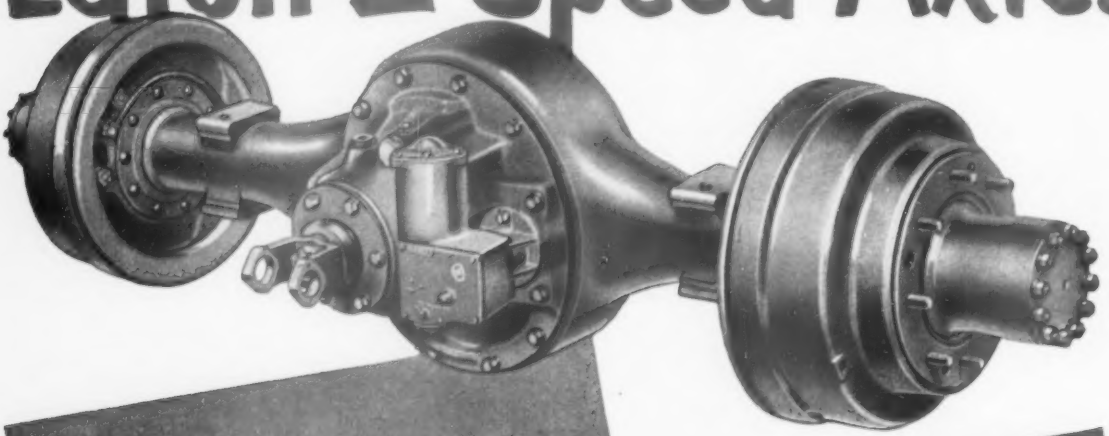

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From the selection of raw material to the finished product, SPANG "CW" Steel Pipe is *quality-controlled!* Rigid metallurgical control during the manufacture of SPANG "CW" assures uniform pipe with many on-the-job advantages. SPANG "CW" is a line pipe that is easily cut, easily bent, and easily threaded for faster installation at lower cost. Add the long service life of SPANG "CW" in the field, and you have line pipe of unequalled quality.

Why not take advantage of SPANG "CW" Steel Pipe on your next piping job? Whether it is to be an oil-gathering system, water system, gas line, air line, water flooding line or a salt water disposal line . . . *quality-controlled* SPANG "CW" will give you more service at less cost.

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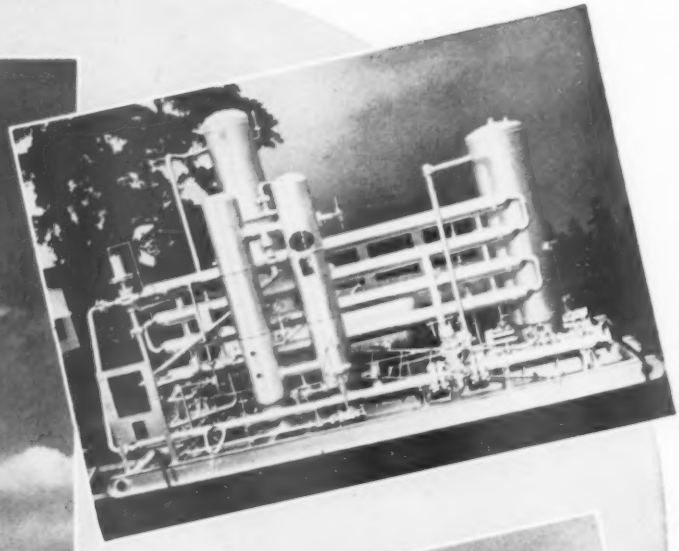
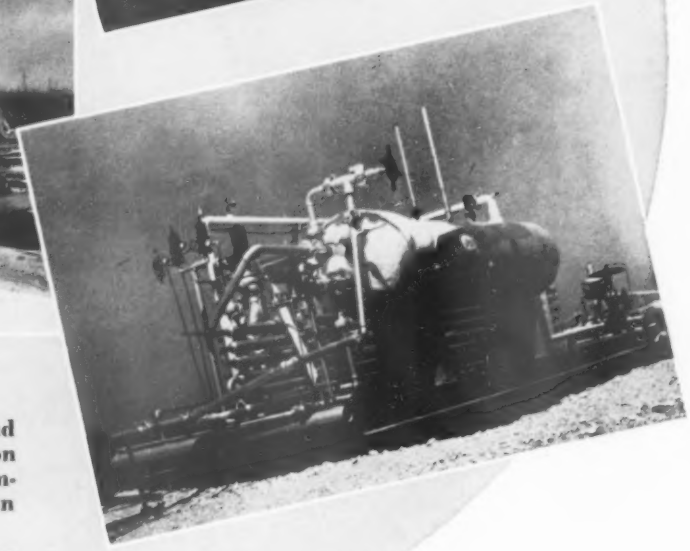
PARKERSBURG HYRECOS..

...are designed to fit *YOUR* wells, not just *ANY* well!





For maximum profits and the most efficient and trouble-free operation, you need a cold separation unit that is built to deliver outstanding performance on YOUR well . . . not just a "good" job on almost ANY well.

This is exactly what Parkersburg Hyrecos are designed to do. Each one is a combination of basic elements assembled to fit ONE SPECIFIC APPLICATION.

Parkersburg, inventor and pioneer of cold separation, has proved by years of experience and trial that no one combination can possibly fit all applications . . . a "universal" cold separation unit is as impossible as a universal hat.

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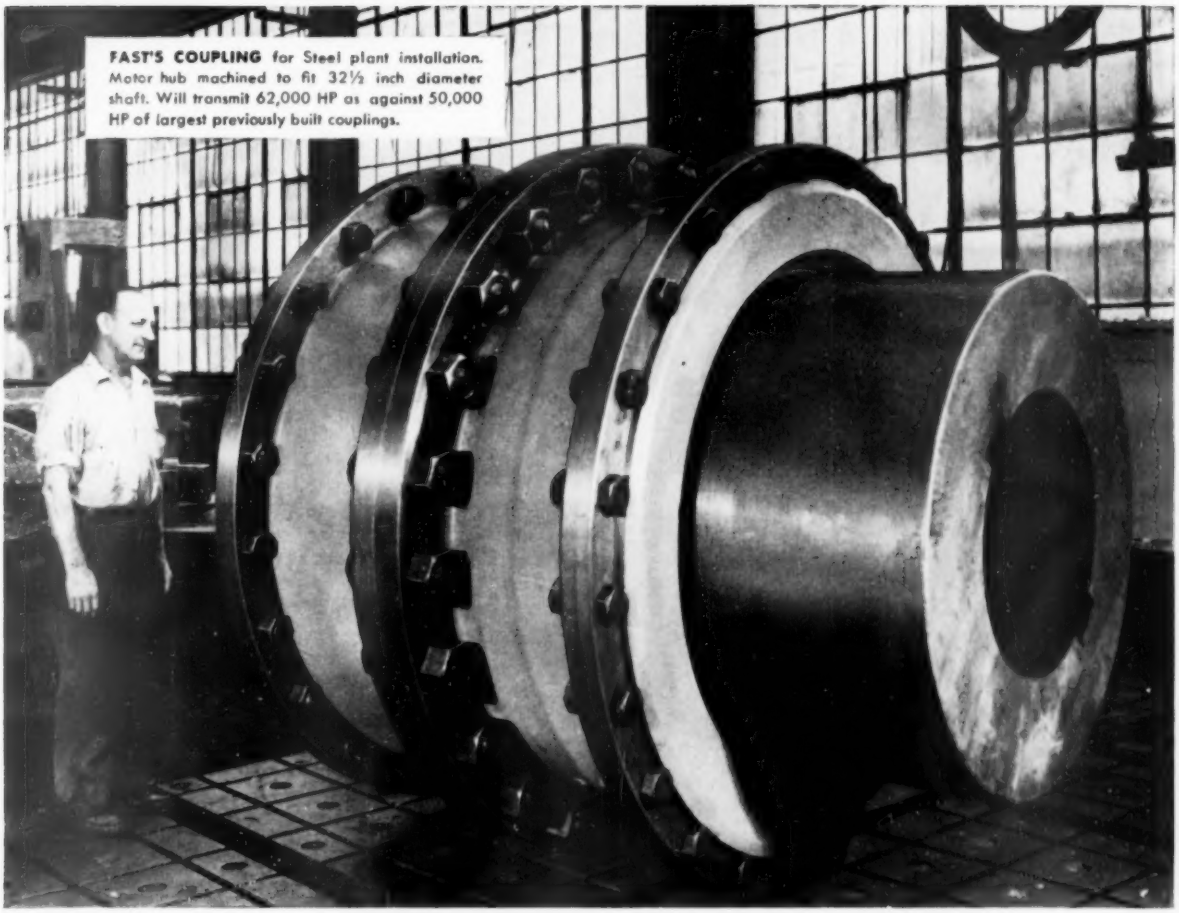

FAST'S COUPLING for Steel plant installation. Motor hub machined to fit 32½ inch diameter shaft. Will transmit 62,000 HP as against 50,000 HP of largest previously built couplings.

WORLD'S LARGEST INDUSTRIAL GEAR-TYPE COUPLING

To make a coupling that will transmit 62,000 HP and compensate for errors in alignment . . . that's more than a man-sized job.

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It will transmit power from an electric motor to the equipment, and, at the same time, compensate for shaft misalignment and lateral float, give maximum power transmission efficiency, eliminate breakdowns and costly down-time.

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This mammoth Fast's Coupling is just one example of the outstanding jobs which Koppers is equipped to handle. 35 years of manufacturing "know-how" go into the production of *all* Fast's Couplings, large and small alike. Engineering specialists, experienced in designing Fast's Couplings for special applications, are well equipped to solve your coupling problems.

Remember, there's a Fast's Coupling for every power transmission application. Next time you have a coupling problem, call on Koppers . . . always ready to serve you. No obligation, of course. Also, for full details on Fast's Couplings for industry, mail this coupon.

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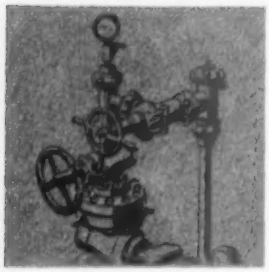
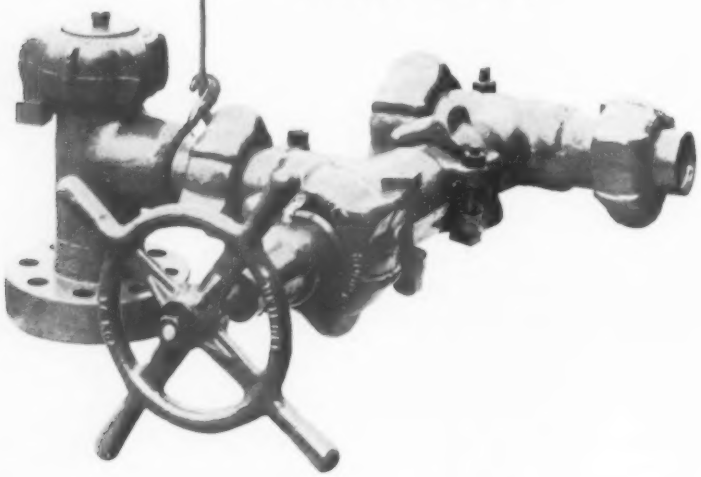
UNIBOLT FLOW MANIFOLDS



started a new trend -- the fabrication of salvageable parts into a compact, strong, lightweight unit that provides everything necessary above the master valve



More and more operators are requesting their Christmas tree supplier to furnish UNIBOLT Flow Manifolds because they are lighter in weight, stronger, and more economical, and easier to maintain than ordinary flanged Christmas tree wings.

Employing standard UNIBOLT connections rather than flanges, the UNIBOLT Flow Manifold is many pounds lighter, yet the UNIBOLT design, which places more steel in shear, actually results in a higher factor of safety for the manifold.

The units of the manifold — UNIBOLT Tee or Cross, Adjustable Wing Valve, and Positive Choke Body — are pressure-tested as a unit and may be assembled in a number of combinations to best meet individual needs. They are furnished in regular forged steel or in stainless steel for corrosive wells — 6,000, 10,000 and 15,000 lbs. test. The manifold is completely salvageable.

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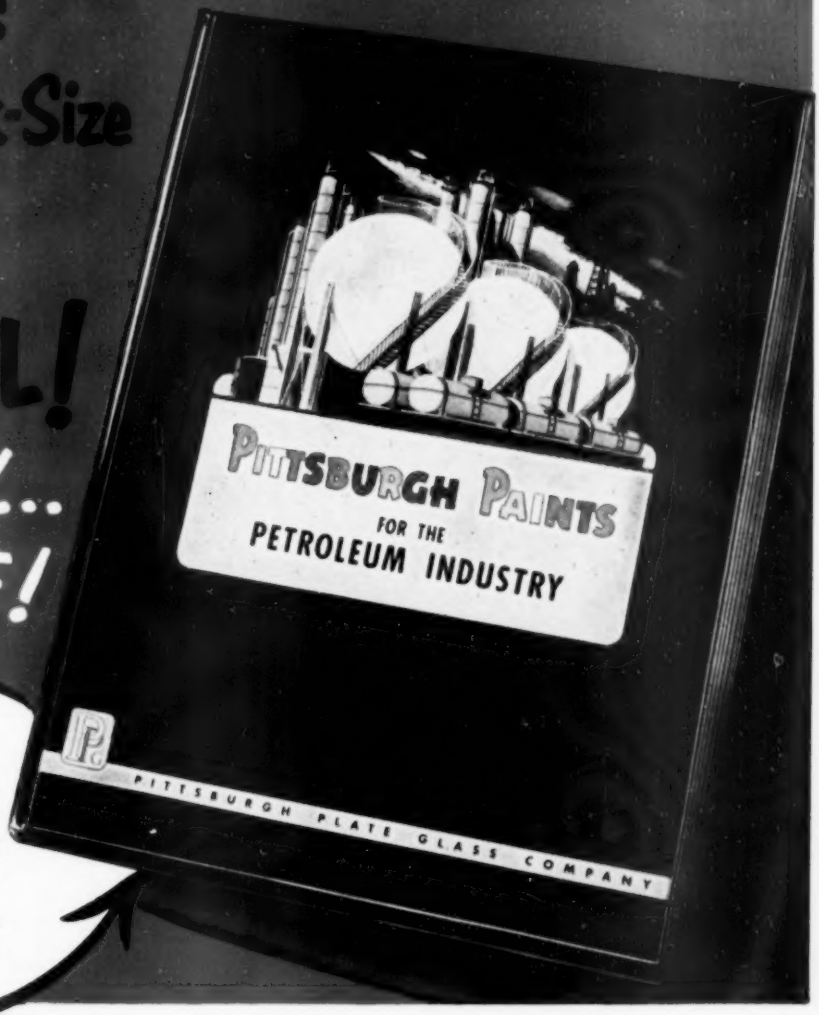

Table of Contents Includes:

1. **Product description.**
2. **Application recommendations.**
3. **Large-size color chips.**
4. **Inspection, surface preparation and painting of storage tanks.**
5. **General maintenance and painting suggestions.**
6. **Recommendations for painting automotive equipment.**
7. **How to use COLOR DYNAMICS painting system.**

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Quick Facts

USES — For work on acid lines, storage batteries, metal plating baths, cleaning and degreasing, foundry shakeout, railroad car cleaning, cleaning coal-handling equipment, work in ships' holds . . . in railroading over dusty runs.

FRAME — Molded from non-irritating, acid-resistant neoprene. Airtight fit helps prevent acid or dust leakage. Bridge and other face-contacting edges are very comfortable.

HEADBAND — Rubber . . . extra wide, easily adjustable.

LENS — Large impact-resistant acetate, easily replaceable. Provides exceptional wide-angle vision. IT CONFORMS TO HIGH SAFETY AND OPTICAL STANDARDS.

NOTE: Goggle may be worn over personal glasses

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Petreco pioneered electric desalting, and has spent many years experimenting, developing and perfecting the best desalting process available. Just compare a Petreco installation with any other! Note the spherical treating vessel; it utilizes minimum ground space and yields higher treating capacities. Petreco transformers are specially designed for the heavy demands of desalting service. Petreco's dual electrode system, with independent transformers, gives greater efficiency and dependability. Petreco's specially designed emulsifying equipment and distributor yield maximum treating efficiency with smoothest possible operation. *In short,* you can't get better desalting equipment than that furnished by Petreco. Make your own comparison!

2. ENGINEERING

In addition to the engineering design that goes into every Petreco desalting unit, the Petreco engineering staff cooperates with the refiner's construction staff or contractor all during the desalter installation. This means that there is an experienced Petreco construction engineer "on the job" during construction, to make sure that your desalter is installed according to most modern practice and with no delay.

3. SERVICE

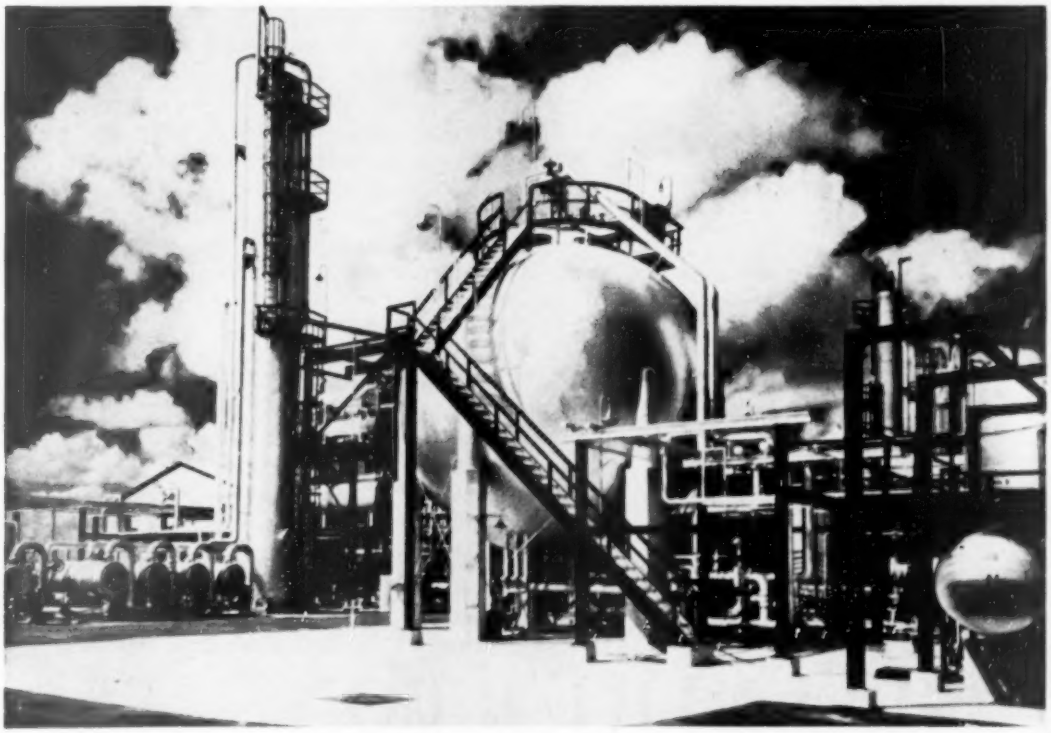
When your Petreco desalter is completed, Petreco desalting engineers make sure that the plant goes on-stream without a hitch by making the adjustments necessary to insure top desalting performance. They instruct refinery personnel in the proper operating methods. Then, with the plant operating smoothly, the Petreco district service engineer takes over the responsibility. Petreco service engineers are trained experts, located wherever Petreco desalters are in use. They are available on twenty-four hour call in case of emergencies.

4. RESPONSIBILITY

The Petreco service engineering staff is a tangible symbol of responsibility. When your Petreco desalting plant goes on-stream, a Petreco service engineer is assigned. He will make sure it operates at the highest levels of safety and efficiency. Petreco responsibility is your assurance of continuing top performance.

5. ECONOMY

The only cheap thing in a Petreco desalter is the cost. The initial installation cost may seem substantial, but when you balance the expense of installation, etc., against the savings, you'll find that a Petreco desalter is the most profitable unit in your refinery. When it starts paying out in terms of longer uninterrupted runs, with more barrels refined per calendar day, the initial cost becomes negligible.



Complete facts on Petreco desalting are yours for the asking. Just write or call

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PS 53-B

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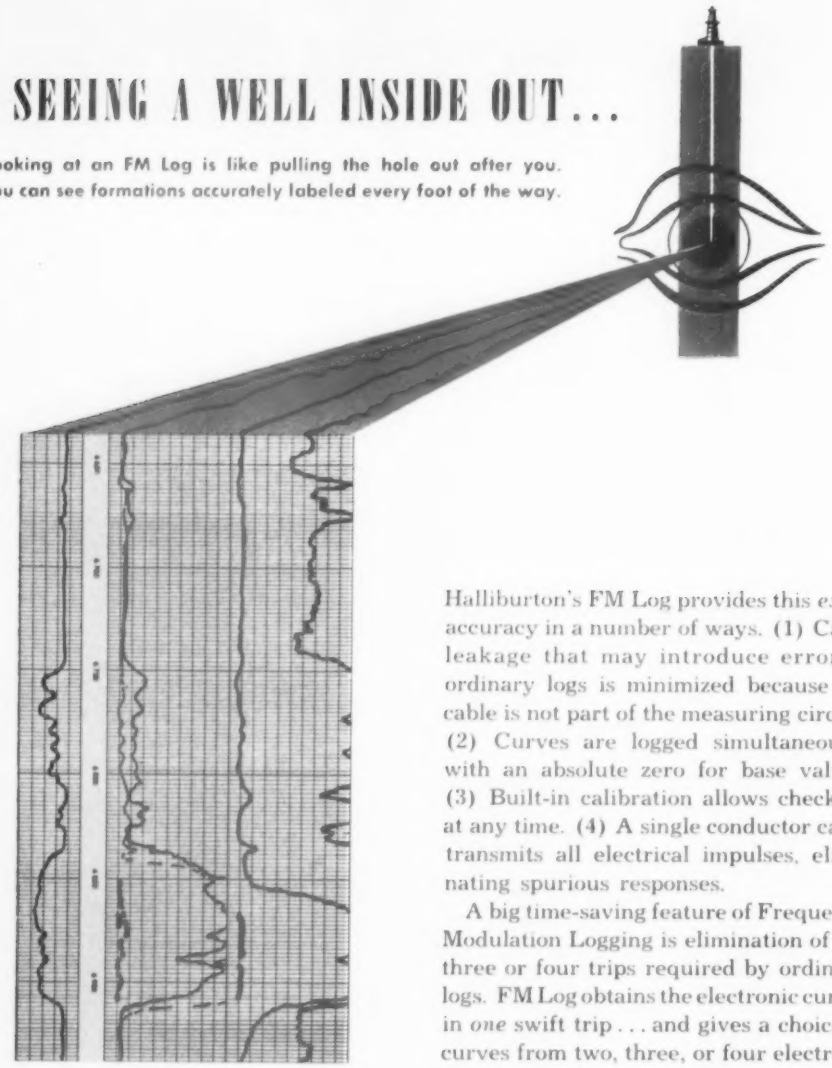
Looking at an FM Log is like pulling the hole out after you. You can see formations accurately labeled every foot of the way.



Halliburton's FM Log provides this *extra* accuracy in a number of ways. (1) Cable leakage that may introduce error in ordinary logs is minimized because the cable is not part of the measuring circuit. (2) Curves are logged simultaneously with an absolute zero for base values. (3) Built-in calibration allows checking at any time. (4) A single conductor cable transmits all electrical impulses, eliminating spurious responses.

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PERPETUAL PROGRESS IN PRODUCTION IMPROVEMENT TECHNIQUES!

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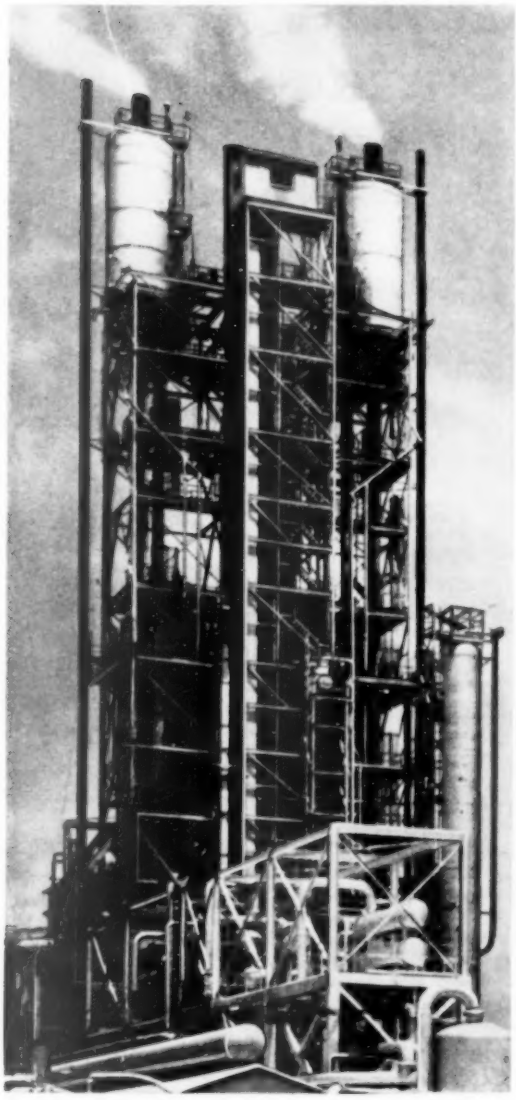

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of **TENAMENE**

inhibitor-sweetening

Nearly all catalytically cracked gasolines respond to Tenamene inhibitor-sweetening—The economy inherent in this single sweetening-gum inhibiting process should be considered by all refiners now constructing or contemplating the construction of cat-cracking units. Important factors which may influence your plans are:

Double function—Tenamene 2 acts both as antioxidant to inhibit gum formation, and as a sweetening agent.

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No gasoline loss—no addition of chemicals at elevated temperatures.

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Tenamene

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SCRAPED SURFACE *Exchangers*

IF you are all "gummed up" with a tough heat transfer problem, Vogt Scraped Surface Exchangers will provide the answer. They have patented scraper elements which prevent fouling of the heat transfer surfaces and insure the highest rate of heat exchange between the product and the cooling or heating medium. The scrapers also continuously agitate the fluid and assist removal of solids from the unit.

DOUBLE PIPE EQUIPMENT is available in two types; EXCHANGERS, for cooling with water, brine, and cold filtrate, and for heating with steam or hot liquids; and CHILLERS, for use with volatile refrigerants such as ammonia, propane, and Freon. Both types have 8" jacket pipes and 6" inner pipes with scrapers.

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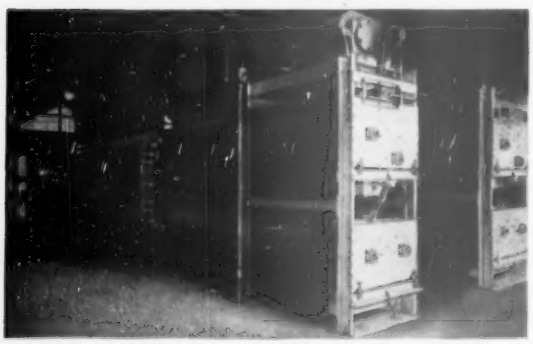
Vogt Scraped Surface Exchangers serve profitably as oil chillers, crystallizers, and heaters in many processes in the petroleum and chemical industries. Their application to your heat transfer problems will receive the prompt attention of our Engineering staff.

Write for Bulletin PE-1

*DOUBLE PIPE UNIT. Drive end close-up of 12 section unit under test in our shop.



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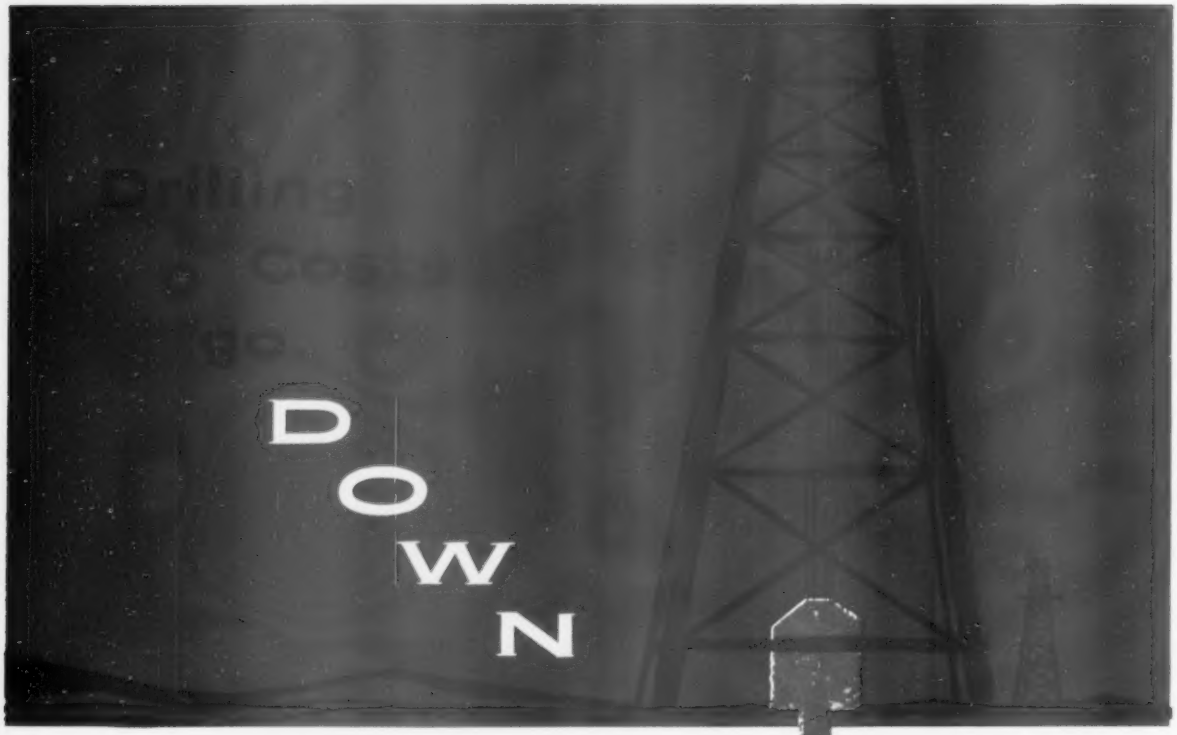


when Diamond Chromates reduce drill-string corrosion

Take out your pencil and figure how many dollars you'd save if the life of your drill strings were increased, say, four times. Quite a saving, isn't it? And it can be done when DIAMOND chromates and bichromates are used to reduce corrosion. In fact, in some cases, drill-string life has been extended as much as *seven times*.

Can you afford not to investigate such a source of savings? Especially when your DIAMOND representative will be glad to back up the facts with technical service.

And while you're talking to the DIAMOND man, ask him how other DIAMOND chemicals are saving money for oilmen as control agents for drilling mud, inhibiting refinery corrosion, and protecting drill strings in heaving shale areas.

Call or write the Sales Office nearest you, or DIAMOND ALKALI CO., 300 Union Commerce Bldg., Cleveland 14, O.

DIAMOND ALKALI COMPANY
CLEVELAND 14, OHIO

DIAMOND SALES OFFICES:

New York,
Philadelphia,
Pittsburgh,
Cleveland,
Chicago,
Cincinnati,
St. Louis,
Memphis,
Houston.

Diamond Chemicals for the Oil Industry

DIAMOND ALKALI CHEMICALS ®

dig this powerful ditcher

PHOTO COURTESY BARBER-GREENE COMPANY, AURORA, ILLINOIS

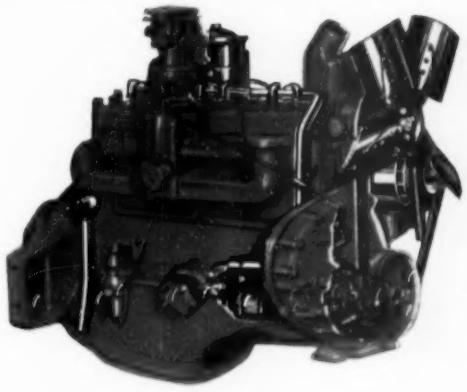
Chrysler *power and gýrol Fluid Coupling team up to put the "run" in runabout.*

When the operator of this ditcher "lowers the boom" things happen fast. That's because the vertical boom concentrates the weight of the unit on the work, bringing additional pressure to bear on digging buckets. This, in turn, allows them to bite into practically any kind of ground formation, frozen soil or even bituminous pavement. Upon completion of digging, a simply-operated hydraulic control raises the boom and the unit takes off—automotive style—down the highway to the next job.

Behind the power and dexterity of the Barber-Greene Runabout is the Model 8 Chrysler Industrial Engine and Chrysler gýrol Fluid Coupling. This 250 cubic inch displacement engine with its wide speed range drives the bucket line, crowds the ditcher along the trench, supplies power to the hydraulic boom hoist and takes the ditcher to the next job at traffic speeds. Chrysler gýrol Fluid Coupling helps the operator coordinate crowding and bucket line speeds for maximum digging efficiency.

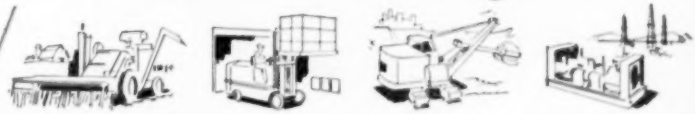
If your equipment requires power within our 217 to 413 cubic inch displacement range, engines that will operate equally well with gasoline, natural or L-P gas fuels, engines ideally suited to power take-off, then see a Chrysler Industrial Engine Dealer. He can supply *engines equipped at the factory for their jobs in the field.*

Remember too that Chrysler Power is not expensive. Production-line methods adapted to specialized industrial engine building provide a custom-built engine at mass-production prices. If you prefer, write: ***Dept. 142, Industrial Engine Division, Chrysler Corporation, Trenton, Michigan.***



CHRYSLER *Industrial Engines*

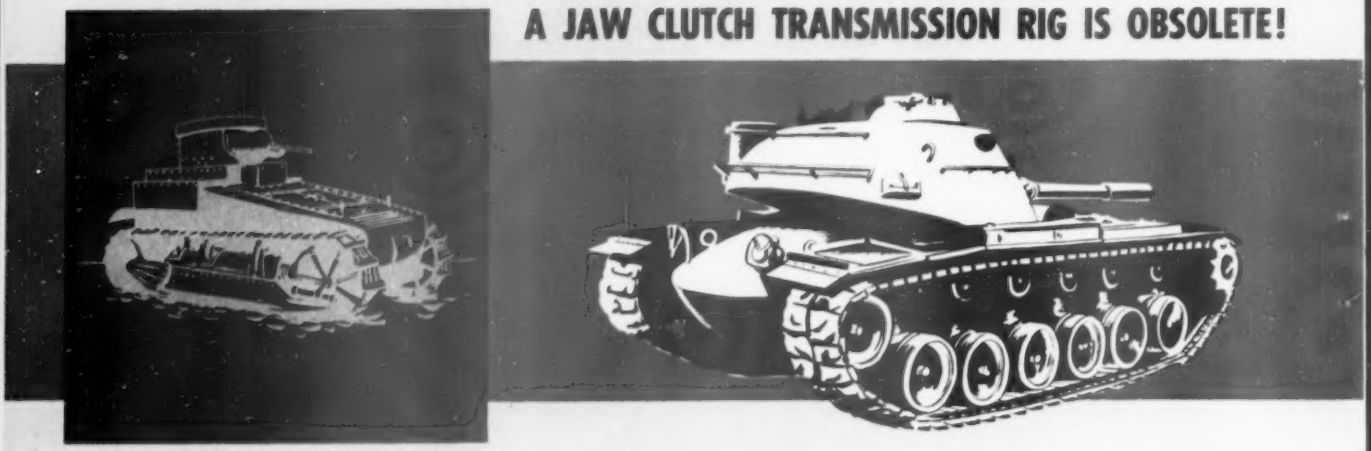
HORSEPOWER WITH A PEDIGREE



AGRICULTURE • INDUSTRY • CONSTRUCTION • OIL FIELDS

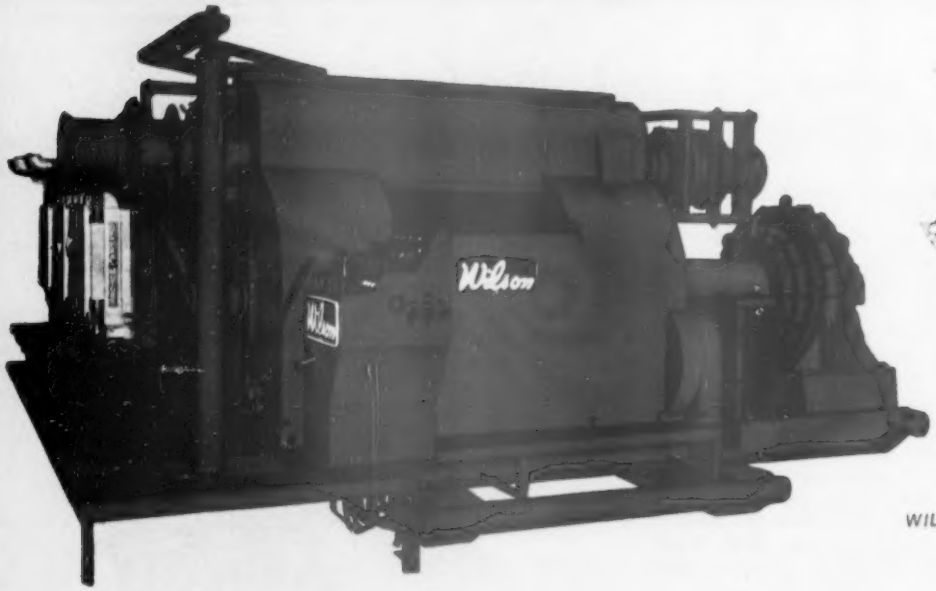
DON'T BUY AN OBSOLETE RIG!

A JAW CLUTCH TRANSMISSION RIG IS OBSOLETE!

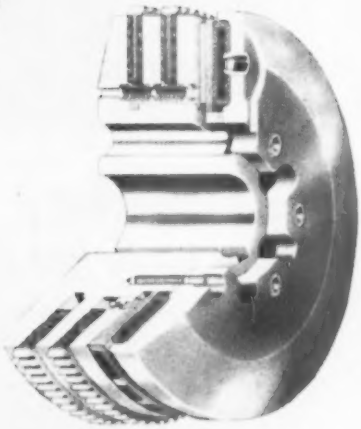


BE MODERN-BUY WILSON!

The ONLY All-Friction Clutch Drive Rig!



WILSON TITAN RIG



AIR-TUBE DISC CLUTCH

Wilson Giant, Atlas, Titan and Super Titan Rigs use Air-Tube Disc Clutches in the compound, transmission and drum drives. You do not have to stop Wilson Rigs to change speeds. Why worry with an obsolete jaw clutch transmission or friction clutches that require cleaning? Be years ahead with Wilson instead. Be Modern—BUY WILSON!

Wilson

The FIRST NAME in DRILLING RIGS!

WILSON MANUFACTURING CO., Inc.

The Home of RED Iron

WICHITA FALLS, TEXAS, U.S.A.

They Say—

Danger in Large Stocks

"It will require considerable patience and strain on the part of many individuals and companies, but I believe that the vast majority of producers and refiners are very sensitive to the danger of unnecessarily large stocks.

"The alternative would be a suicidal surplus. The next few months should see an improved situation.

"Excessive inventory in any line of business is one of the worst symptoms of a recession and in our part of the country where so much is dependent on stabilized oil production, I believe it will not be in the public interest to undergo the 'fits and starts' of big buildups, possible price breaks, and drastic curtailment of drilling."

Statement of Harry W. Bass, president, Texas Mid-Continent Oil and Gas Association, Dallas.

Customers are Human Beings

"A business enterprise may have the finest plant possible, the best products known to science, plenty of retail outlets, a sound financial position, the confidence of its stockholder-owners, and employes who are conscientious, capable, and industrious. Nevertheless—

"It may fail of success if it forgets the essential fact that its customers are human beings.

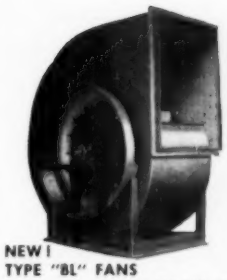
"Many customers will walk or drive a mile to deal with someone they like. A captain of industry once stated that in his considered judgment and observation, a substantial per cent of business is created and held on the basis of friendship."

W. Alton Jones, chairman of the board, Cities Service Co., in an editorial in Service.

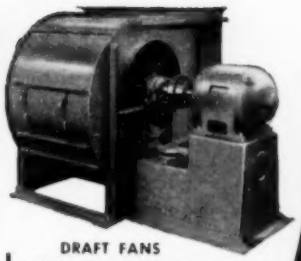
No Danger of Losing Pants

"What the guesstimates of the experts seem to add to at the moment is that we undoubtedly will have a leveling off of the boom we have known over the past 12 years or so. We may have a recession. We probably will not have a depression.

"You know the definitions of recession and depression, of course. It's a recession when you have to tighten your belt a few notches to keep your pants up. It's a depression when you don't

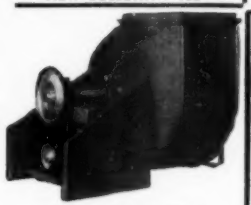


NEW! TYPE "BL" FANS
In sizes for 1,000 to 500,000 cfm, these new non-overloading fans for general ventilation and air conditioning offer even finer performance than their famous predecessors, the "LL" Fans.
NEW BULLETIN F-100



DRAFT FANS
"Buffalo" mechanical Draft Fans are helping turn out low-cost steam in plants and major utility stations everywhere.
BULLETIN 3750

THE FAN for your JOB is on THIS PAGE—



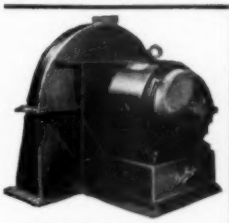
BELTED VENT SETS
Non-overloading ventilating fans for duct or free air delivery. Extra quiet.
BULLETIN 3720

"Buffalo" Fans give "extras" in performance for two reasons: First, the line is so complete that you can pick — with mathematical accuracy — the fan to give you best possible results on almost any air moving job you could name. Second is the "Q" Factor, or inbuilt quality that "Buffalo" engineers have always insisted on. Why not have us mail you Bulletins on the right fans for your air job — from the complete line shown here?

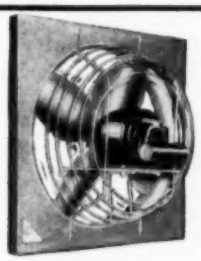
"Buffalo" FIRST FOR FANS
. . . and for satisfaction in your PUMPING applications
. . . check into "Buffalo" Centrifugal Pumps. Every industry depends on them. There is one to fit your hydraulic conditions. Representatives in principal cities.

BUFFALO FORGE COMPANY
525 BROADWAY BUFFALO, N. Y.
Publishers of FAN ENGINEERING Handbook
Sales Representatives in all Principal Cities

AXIAL FLOW FANS
Compact, light, highly efficient ventilating fans for light duty. BULLETN 3533

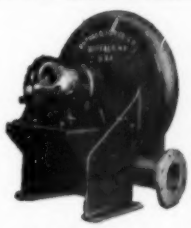


PRESSURE BLOWERS
Compact blowers for high pressures in a single stage. "CB" blowers develop up to 2¼ psi, and "Buffalo" type "CC" Blowers handle up to 4 pounds!
BULLETIN 3553

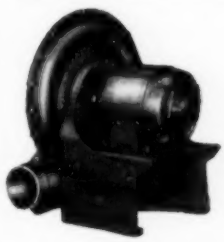


New! NV-BREEZO FANS
High efficiency on free air delivery or ¼" to ½" s.p. 8" to 24" sizes. BULLETIN 3865. Also ask about the new BELT-AIR line.

INDUSTRIAL EXHAUSTERS
All welded for strength and high efficiency. With air or material wheels.
BULLETIN 3576



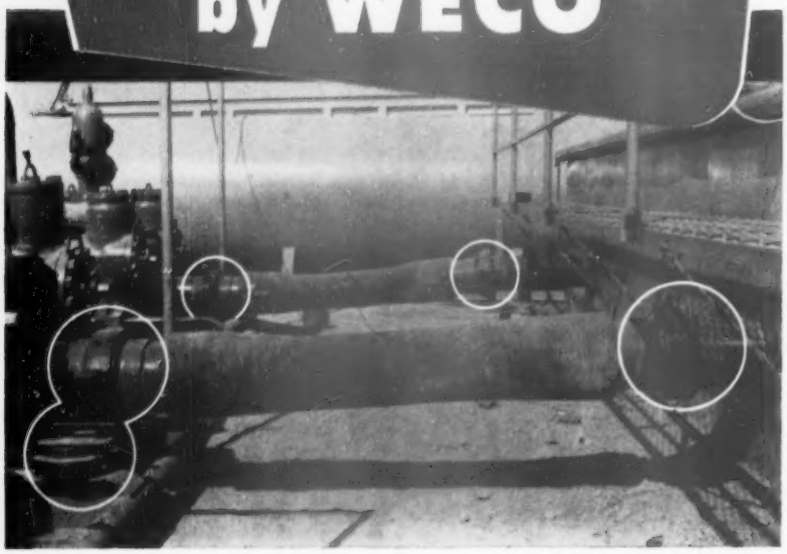
"RE" BLOWERS - EXHAUSTERS
For pressures up to 40" of water; 50 to 1600 cfm. Furnace blowing, line boosting.
BULLETIN 3014



"E" BLOWERS - EXHAUSTERS
For low to medium pressures and volumes in draft, cleaning, line boosting. BULLETIN 3014

VOLUME FANS
Rugged blowers-exhausters with cast iron housings and dust-proof ball bearings for any job up to 10" s.p.
BULLETIN 3615

PUMP SUCTION CONNECTIONS by WECO



● Use of WECO Fig. 400 Unions on each end of these suction lines between mud tank and pump saves time in rigging-up and tearing down. The blanking plug, which can be quickly installed, eliminates the need for valves or line blinds when compounding the pumps.

The WECO Ball and Cone Seat assures a positive seal for the life of the union . . . you never have to worry about leaks. These 4000 p. s. i. Unions are available in sizes 6" through 10". Use Fig. 400 Unions for your pump suction connections.

PESA

It's Wise to Standardize with... WECO ...

WELL EQUIPMENT MFG. CORP.

Division of Chiksan Company
HOUSTON 1, TEXAS

CHIKSAN COMPANY

Brea, Calif. Chicago 28, Ill. Newark 2, N. J.

CHIKSAN EXPORT COMPANY, Brea, Calif. Newark 2, N. J.

Manufacturers and Distributors of Oilfield, Refining, Marine and Industrial Equipment

have a belt to tighten. And it's a panic when you don't have any pants.

"We in the oil industry, particularly, are in no danger of losing our pants—unless we mismanage them away—and in little danger of losing our belts."

Dwight F. Benton, vice president in charge of sales, Standard Oil Co. (Ind.), in an address before the Northwest Jobbers Association at Minneapolis, Minn.

Basic Pipe-Line Construction Needs

"What does it take to build a 'big inch' pipe line? There is no mystery about it and there are no miraculous short cuts. The same rules apply that apply on all heavy construction. There are just two fundamental needs: plenty of heavy equipment and good management. You must have both—they are equally important—one of them alone will not do the job. Weather is a controlling factor on all pipe-line jobs, but the worse the weather the more you need experienced men and good equipment."

Harold C. Price, president, H. C. Price Co., Bartlesville, Okla., in The Tie-In.

Refinery Expansion Importance

"Refinery expansion doesn't capture the imagination like an oil field boom. But in providing improved refinery equipment an oil company is building for the future just as surely as when it locates the discovery well of a new field.

"In this growing country Canadians need not only more and more oil, but also products that can be obtained only through the science of the most modern processing methods. An oil company with the best refining equipment is in the best position to supply quality products at economic prices.

". . . In refining, as in the other phases of the oil industry, it takes a lot of money to stay in business."

Editorial in Imperial Oil Review.

CALENDAR OF EVENTS

FEBRUARY

11-12 Western Petroleum Refiners Association, regional meeting, Hotel Beaumont, Beaumont, Tex.

14-18 American Institute of Mechanical and Metallurgical Engineers, Hotel Statler, New York.

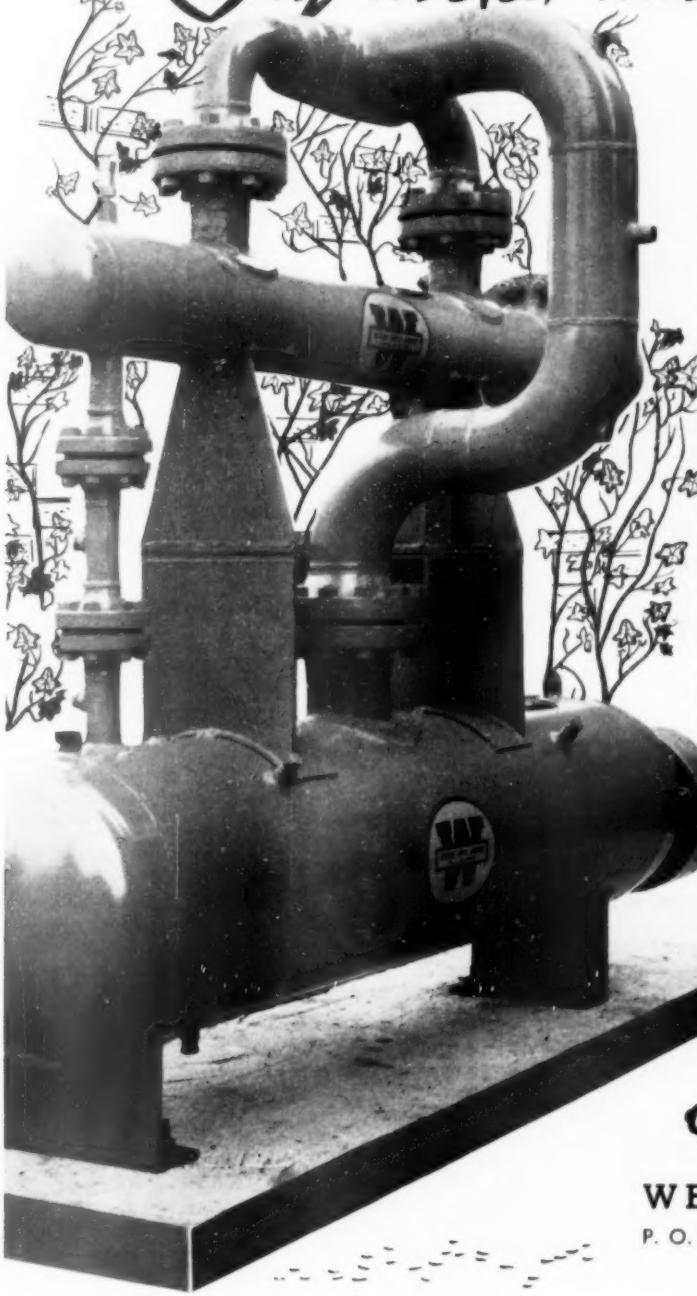
15 American Society for Testing Materials, southwest district (Dallas-Fort Worth), and National Association of Corrosion Engineers, joint meeting, Dallas.

"THE BRAND OF PROGRESS"

By Heat Exchanger Specialists

▲ SYNOPSIS OF AD NO. 2: Although Western Supply Company serves the petroleum, chemical and petro-chemical industries nation-wide, the company's physical plant is limited. These limitations, however, have been carefully planned to offer Western's customers a flexible service in heat exchanger fabrication from both common and alloy metals. Although not the largest, Western is recognized as one of the most modernly equipped heat exchanger plants in the country.

Ivy covered walls for better HEAT EXCHANGERS



In an effort to add to the knowledge and technology of heat transfer, Western Supply sponsors research at the internationally known Petroleum Sciences College at the University of Tulsa. Heat transfer rates are carefully studied using various fluids under a wide range of temperatures and pressures. With equipment installed by Western, students and professors may study boiling, condensing, forced convection transfer rates and fouling characteristics.

This, however, is but one phase of Western's continuous research program. In addition, the company is an active participant in the studies of the Tubular Exchanger Manufacturers Association. For several years TEMA, in cooperation with other technical groups, has been conducting tests on shell-side transfer rates using equipment installed at the University of Delaware. Metallurgy, too, is studied by Western technicians and an experienced metallurgist of over 25 years experience consults daily with Western Engineers on welding, heat treating and corrosion problems as well as exchanger structural design.

The above is a brief summary of Western's research program . . . a program designed and carried on to offer you, the customer, the benefits of better design, better construction for increased operating efficiency and longer life for your Western Heat Exchangers.

Third in a new series of advertisements

WESTERN

HEAT EXCHANGERS

WESTERN SUPPLY CO.

P. O. BOX 1888 • TULSA, OKLAHOMA

New! ELECTRIC STARTING SEA-HORSE 25

Push-Button Starting

- **Electric Starting!** — ALSO EQUIPPED FOR MANUAL STARTING
- **25 Horsepower!**
- **Speeds over 30 mph!**
- **Fitted for Ship-Master Remote Control!**
- **Gear Shift!** FORWARD-NEUTRAL-REVERSE
- **Mile-Master Fuel System!** 6 GALLONS
- **Fitted for Fuel-Master Supply System!**
- **Twist-Grip Speed Control!**

Johnson
SEA-HORSE
OUTBOARD MOTORS

Talk about the "automatic outboard." This is IT! Here is everything that has made the Sea-Horse 25 sensational — PLUS JOHNSON-ENGINEERED ELECTRIC STARTING!

It spins into action at the first touch of the starter button (still equipped for manual starting, too). In fact, this great motor is engineered so that you can choke, start, shift, throttle, steer, and stop *without leaving your seat up front!* In addition to the 6-gallon Mile-Master Fuel System (standard equipment), it's fitted for Johnson's amazing new Fuel-Master Supply System, for *extra-long* cruising range — and Ship-Master Remote Control, for shift-and-throttle operation.

Nothing has ever been created to make outboard handling so simple, so convenient, so luxurious. Get the full story. See your Johnson Dealer. Look for his name under "Outboard Motors" in your classified phone book.

5 GREAT SEA-HORSES FOR 1954

ELECTRIC STARTING SEA-HORSE 25—25 hp. The "automatic outboard"	$498.00*
SEA-HORSE 25—25 hp. Over 30 mph! Everything Deluxe	$410.00*
SEA-HORSE 10—10 hp. New! Improved! Now more brilliant than ever!	$297.50*
SEA-HORSE 5½—5½ hp. Revolutionary *Quiet!* Suspension Drive. All the "big-motor" features with "little-motor" weight	$210.00*
SEA-HORSE 3—3 hp. "The littlest Sea-Horse." Rugged. Amazing Angle-matic Drive	$145.00*
SHIP-MASTER REMOTE CONTROL—Shift-and-throttle. Corrosion-proof. Instant hook-up on Sea-Horse 5½, 10 and both 25's. From	$29.50*

**Prices f.o.b. factory, subject to change. OBC certified brake hp at 4000 rpm.*

FREE!

Send for colorful, fully-illustrated catalog which describes, in detail, the Electric Starting Sea-Horse 25 and the four other great Johnsons. Catalog is yours for the asking. Write to:

JOHNSON MOTORS
6600 Pershing Road, Waukegan, Illinois
In Canada: Mfd. by Johnson Motors, Peterborough

17-19 Corrosion Control Short Course, fifth annual, Tulsa section of National Association of Corrosion Engineers, Mayo Hotel, Tulsa.

19-20 National Society of Professional Engineers, spring meeting, Hilton Hotel, Albuquerque, N. M.

22 American Association of Petroleum Geologists, Rocky Mountain section, annual meeting, Albuquerque, N. M.

26 Natural Gasoline Association of America, Permian Basin regional meeting, Lincoln Hotel, Odessa, Tex.

MARCH

1- 5 American Society for Testing Materials, spring meeting, Shoreham Hotel, Washington, D. C.

3- 5 American Petroleum Institute, Division of Production, Southwestern district, Rice Hotel, Houston.

4- 5 American Gas Association, transmission and storage conference, Jung Hotel, New Orleans.

8-10 American Institute of Chemical Engineers, Statler Hotel, Washington.

15-19 National Association of Corrosion Engineers, annual meeting, Municipal Auditorium, Kansas City, Mo.

17-19 American Petroleum Institute, Division of Production, Mid-Continent district, Biltmore Hotel, Oklahoma City.

23-April 1 American Chemical Society, annual meeting, Municipal Auditorium, Kansas City, Mo.

26 American Chemical Society and Sabine Area American Institute of Chemical Engineers, joint session, Beaumont, Tex.

29-31 Western Petroleum Refiners Association, annual meeting, Plaza Hotel, San Antonio, Tex.

APRIL

4- 6 Texas Independent Producers and Royalty Owners Association, Rice Hotel, Houston.

5- 7 American Society of Lubrication Engineers, Netherland-Plaza Hotel, Cincinnati.

6- 8 Petroleum Industry Electrical Association, annual convention and exhibit, Adolphus and Baker Hotels, Dallas.

8- 9 American Petroleum Institute, Division of Production, Rocky Mountain district meeting, Townsend Hotel, Casper, Wyo.

8- 9 Second annual instrumentation conference, Louisiana Polytechnic Institute, Ruston, La.

12-16 American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, and Society of Exploration Geophysicists, annual meeting, St. Louis.

13-15 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, Okla.

14-16 National Petroleum Association, fifty-first semiannual meeting, Cleveland Hotel, Cleveland.

21-23 Natural Gasoline Association of America, thirty-third annual convention, Baker Hotel, Dallas.

22 Illinois Oil and Gas Association, annual directors meeting, Hotel Emmerson, Mount Vernon, Ill.

26-28 Southern Gas Association, annual convention, Houston.

MAY

2- 4 Independent Petroleum Association of America, midyear meeting, Cosmopolitan Hotel, Denver.

3- 5 American Geophysical Union, thirty-fifth annual meeting, National Academy of Sciences, Washington, D. C.

Important in Pipe Coating and Wrapping, too!

Pipe Line Service "babies" your pipe to give it the finest possible protection. For example, the first step is to condition the pipe by putting it through scientifically controlled drying ovens. This safeguard eliminates moisture, brings the pipe to the proper temperature and insures the most efficient application of the protective materials. That's why you get more for your money through modern, under-roof cleaning, priming, coating and wrapping at PLS.

PLS

PIPE LINE SERVICE CORPORATION

Pioneers in Steel Pipe Protection

General Offices and Plant • Franklin Park, Illinois

Plants at Glenwillard, Penna.; Longview, Texas; Corpus Christi, Texas; Harvey, La.; and Sparrows Point, Md.

Dependable Service Since 1931

on job after job...
YOU'LL FIND
Snap-on*
BOXOCKETS
the handiest, safest, fastest wrenches you have ever used

Put *speed* on the job . . . with Snap-on Boxockets . . . far stronger and many times safer than open end or adjustable wrenches! Offset heads provide ample clearance in tight places. Double hexagon openings completely encircle the nut—grip securely on all six corners—cannot slip—cannot spread—and require only half the turning space where movement is limited. Each Boxocket provides two wrench sizes in each handle. Complete series covers full range of sizes, 3/8" to 1 5/8". Other types—Midget, Dwarf, Heavy Duty and Sledge—3/16" to 4 5/8". Write for Industrial Catalog and General Catalog of 4,000 Snap-on tools for production and maintenance.

XV-611-K OFFSET BOXOCKET SET—Consists of 11 wrenches, range 3/8" to 1 1/4", in handy kit bag. Provides 22 wrench sizes with six popular sizes duplicated.

Snap-on
SERVES INDUSTRY EVERYWHERE THROUGH THESE 43 FACTORY BRANCH WAREHOUSES

Albany, N. Y., ALbany 4-2971
Atlanta, Ga., LAmar 4031
Baltimore, Md., HOpkins 7-4666
Boston, Mass., STadium 2-2230
Brooklyn, N. Y., SLocum 6-8707
Buffalo, N. Y., GArfield 6374
Charlotte, N. C., 3-8831
Chicago, Ill., TAylor 9-2651
Cincinnati, Ohio, WOodburn 3188
Cleveland, Ohio, PRospect 1-4400
Dallas, Texas, RIverside 1611
Denver, Colo., ALpine 5406-07
Detroit, Mich., TRinity 5-6455
Fargo, N. Dakota, 5790
Houston, Texas, BLackstone 5404
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Kansas City, Mo., WEstport 0364-65
Los Angeles, Calif., DUnkirk 83445
Miami, Fla., 64-5074
Milwaukee, Wis., WEst 3-3116-17
Minneapolis, Minn., GEneva 5367
Newark, N. J., ESsex 5-3197-98
New Orleans, La., RAymond 2418
New York, N. Y., TUlip 2-6868
Oklahoma City, Okla., FOrest 5-4975
Omaha, Nebr., PL-2116
Philadelphia, Pa., POplar 5-7400-01
Pittsburgh, Pa., MOntrose 1-7600
Richmond, Va., 5-8115
St. Louis, Mo., NEwstead 1150-51
San Francisco, Calif., UNderhill 3-3195
Seattle, Wash., CApitol 3646
Syracuse, N. Y., 75-2924
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Vancouver, B. C., TAtlow 1561
Winnipeg, Man., 6-5093

SNAP-ON TOOLS CORPORATION
8098-B 28th Ave. • Kenosha, Wisconsin

*Snap-on is the trademark of Snap-on Tools Corporation

3- 5 Air Pollution Control Association, annual meeting, Patten Hotel, Chattanooga, Tenn.
6- 7 American Petroleum Institute, Division of Production, Pacific Coast district meeting, Statler Hotel, Los Angeles.
9-12 Liquefied Petroleum Gas Association, annual convention and trade show, Conrad Hilton Hotel, Chicago.
10-12 American Petroleum Institute, Division of Transportation, Products Pipe Line Conference, Warwick Hotel, Philadelphia.
10-13 American Petroleum Institute, Division of Refining, midyear meeting, Rice Hotel, Houston.
14-15 Interstate Oil Compact Commission, General Oglethorpe Hotel, Savannah, Ga.
16-19 American Institute of Chemical Engineers, Springfield, Mass.
17-19 American Petroleum Institute, Division of Marketing, midyear meeting, Cosmopolitan Hotel, Denver.
24-26 American Gas Association, production and chemical conference, William Penn Hotel, Pittsburgh.
27-28 Natural Gas and Petroleum Association of Canada, Prince Albert Hotel, Windsor, Ont., Canada.
31-June 5 American Petroleum Institute, Division of Production, midyear committee conference, St. Francis Hotel, San Francisco.

JUNE

3- 4 Pennsylvania Grade Crude Oil Association, thirty-first annual meeting, Hotel William Penn, Pittsburgh.
6-11 Society of Automotive Engineers, summer meeting, Ambassador and Ritz-Carlton Hotels, Atlantic City, N. J.
13-18 American Society for Testing Materials, annual meeting and exhibit, Sherman and Morrison Hotels, Chicago.
17-19 American Petroleum Institute, Division of Production, eastern district meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.
20-24 Canadian Gas Association, Banff Springs Hotel, Banff, Alta., Canada.
27 July 1 Petroleum Equipment Suppliers Association, nineteenth annual meeting, Manoir Richelieu, Murray Bay, Que., Canada.

AUGUST

17-19 Society of Automotive Engineers, Inc., international West Coast meeting, Georgia Hotel, Vancouver, B. C., Canada.

SEPTEMBER

9-11 Interstate Oil Compact Commission, Omaha, Neb.
12-16 American Institute of Chemical Engineers, Colorado Hotel, Glenwood Springs, Colo.
15-17 National Petroleum Association, fifty-second annual meeting, Traymore Hotel, Atlantic City, N. J.
28-29 Texas Mid-Continent Oil and Gas Association, annual convention, Baker Hotel, Dallas.

OCTOBER

7- 8 California Natural Gasoline Association, twenty-ninth annual fall meeting, Ambassador Hotel, Los Angeles.
11-13 American Gas Association, annual convention, Atlantic City, N. J.
11-13 American Association of Oilwell Drilling Contractors, annual meeting, Biltmore Hotel, Los Angeles.
14-17 Permian Basin Oil Show, Odessa, Tex.

- Fast, efficient service day or night . .
- Strategically located stores and offices
- Nationally known products
- Everything from the largest rig to the smallest part
- Remember United Supply and forget your oil field supply troubles . .

They're always here with the supplies I need . . . when I need them!

Yes, United Supply's reputation in the oil industry is built on better service. . . . Conveniently located stores and offices are geared to your requirements to take care of every supply problem from the largest rig to the smallest part. Your nearest United Supply store handles Nationally-known quality products and maintains a service department for your convenience. On your next supply problem, give United Supply an opportunity to demonstrate our ability to serve you better.

YOU CAN RELY ON UNITED SUPPLY!
UNITED SUPPLY
COURTESY • SERVICE • DEPENDABILITY

UNITED SUPPLY

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TULSA, OKLAHOMA

Stores in: KANSAS, OKLAHOMA, TEXAS, LOUISIANA, AND NEW MEXICO

COURTESY • SERVICE • DEPENDABILITY

what are the important factors in

FLOATING ROOF DESIGN?

Here are the Floating Roof Specifications which 30 years' experience has shown are necessary for best performance.

1. **Well designed, close fitting Seals; including Primary, Secondary, and Top Seals for maximum conservation.**
2. **Pontoons divided into large number of GAS-TIGHT compartments for safety.**
3. **Pontoon compartments Deep and Roomy so they may be easily entered and inspected for maintenance if necessary.**
4. **Pontoon compartments uncluttered with framework for easy inspection and maintenance.**
5. **COMPLETE CLEAN Drainage.**
6. **Roof designed to take ALL LOADS to which the structure may be subjected, with better than normal safety factor.**
7. **Pontoons designed to maintain buoyancy under all anticipated conditions.**
8. **Assure full use of the capacity of the tank for in and out storage.**

These specifications are met in every respect by the Wiggins Floating Roof and ONLY the Wiggins Floating Roof

by **GENERAL AMERICAN**

WIGGINS VAPOR SEALS GENERAL AMERICAN TRADE MARK

GENERAL AMERICAN TRANSPORTATION CORPORATION

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THE OIL AND GAS
JOURNAL
TULSA, OKLAHOMA

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JOURNALLY Speaking

Trouble with Hannah

FOR no particular reason other than a desire to be helpful, a constant reader of this department sends a bit of oil-industry history which is both amusing and enlightening. We don't know a thing about the circumstances, background, or participants in this incident; just that this is the text of a resolution adopted in January 1873 by small oil producers along the Clarion River in Pennsylvania:

"Resolved, that in consideration of the position taken by the 'large producers' in the matter of the combination, the 'small producers' of Clarion County do hereby resolve that we, the said 'small producers' don't care a damn for the combination or for the 'large producers' or for anybody else and that's what's the matter with Hannah."

Talk about independents! Those Clarion producers were really self-reliant and rugged individualists, and suited words to action. A short and sweet resolution, pithy and pungent if we ever read one. We don't know what happened to the "small producers," the "large producers," or the "combination," but we do know that the spirit of this Clarion call survived with great vigor. The oil industry is what it is today because it is full of people who don't care a damn for anybody else and that's what's the matter with Hannah.

Still on Top

HO hum, this is getting monotonous. But for the sake of the record we'll risk boring you by stating that our favorite oil publication is still the biggest magazine in the world, and by a wider margin than ever. This is the fifth consecutive year that the Big Yellow Book has held the No. 1 spot.

The figures come from Industrial Marketing, a magazine which makes it a point to count the pages of advertising carried by other magazines. Last year The Oil and Gas Journal carried 7,912 pages of advertising, a gain of 288 over the 1952 volume.

Industrial Marketing groups us with 168 industrial papers, and this group as a whole showed an advertising gain of 3.6 per cent during 1953. In this group are 12 oil and gas papers, and they carried a total of 24,374 pages of advertising in 1953, which was 882 pages, or 3.75 per cent, ahead of 1952. So you can see that the Journal carried pretty close to one-third of all the advertising placed in its field. Our percentage gain was 3.8, and since we had such a big 1952 base to start with we had to add a lot of pages in order to keep up with the parade percentagewise.

Naturally, this situation is quite pleasing to us, but there's always a fly in the ointment. It causes an endless argument around our shop. The advertising men claim that it's due entirely to their superb salesmanship, while the editors insist that the quality of what they write is so outstanding that the magazine sells itself.

For comparison, here are the top-ranking magazines, with the number of pages of advertising carried in 1953: The Oil and Gas Journal, 7,912; Iron Age, 7,311; American Machinist, 6,875; Steel, 6,532; Electronics, 4,768; Engineering News-Record, 4,550; Electrical World, 4,464; Product Engineering, 4,423; Chemical Engineering, 4,304; Life, 4,294; Saturday Evening Post, 4,186; Time, 3,561.

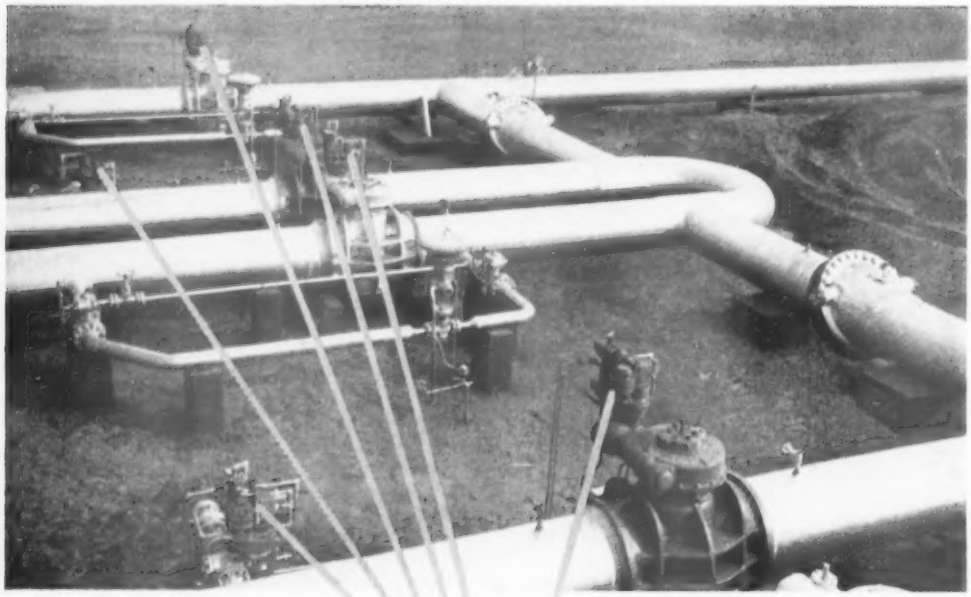
Interplanetary Problem

ANOTHER contributor (bless 'em all) sends in a headline clipped from a newspaper and reading "Jupiter's Oil Reserves Put At 3,023,761 Bbl." He's worried for fear the oil producers of the big red planet may soon start exporting to the United States and he says, with some justification, that independent producers in his state have enough worries over competition from other parts of this planet without having to face the prospect of interplanetary competition.

Relax, friend. You've been reading too many of Junior's space-travel comic books. That headline simply referred to a routine financial report of Jupiter Oils, Ltd., a Canadian producer.

—*Henry D. Ralph.*

PROGRESSIVE *Gas* PIPELINERS SPECIFY



E-I-M

G-2 TYPE VALVE CONTROLS

Major pipelines depend on E-I-M Valve Controls for opening and closing valves of all sizes quickly and with precision. The Type G-2 Valve Control is powered by the product in the transmission line without a pressure drop. It is activated remotely by pushbutton or radio and flashes back a signal when the operation is completed. When you need speed, dependability and accurate control for your pipeline, you know you can depend on E-I-M Valve Controls. Whatever your transmission problem, let our engineers help you solve it.

E-I-M *Company* INCORPORATED

1340 OLD SPANISH TRAIL • HOUSTON 25, TEXAS • MOhawk 4587
Valve Controls • Speed Reducers • Cooling Tower Drives • Control Valves

Gasoline stocks are at the danger point

REFINERS are acting as though they can't read charts and figures and never heard of the law of supply and demand. By their unprecedented buildup of gasoline stocks they are spelling trouble for themselves and for the entire oil industry.

This is apparent in the factual analysis of gasoline production and stocks in this issue of the Journal.

With gasoline consumption off nearly 12 per cent from last summer, production is down just a fraction of 1 per cent. With gasoline stocks at their highest point in history 3 months before the motoring season starts, output is nearly 4 per cent above last year and inventories are piling up with alarming rapidity.

The many new refining processes and modern units put into operation during the past couple of years have pushed gasoline yields from a barrel of crude up to an astonishingly high ratio. This has increased the percentage of petroleum going into the industry's "money crop" (gasoline) but, as farmers have found out, when any crop is in big surplus its total money yield may drop.

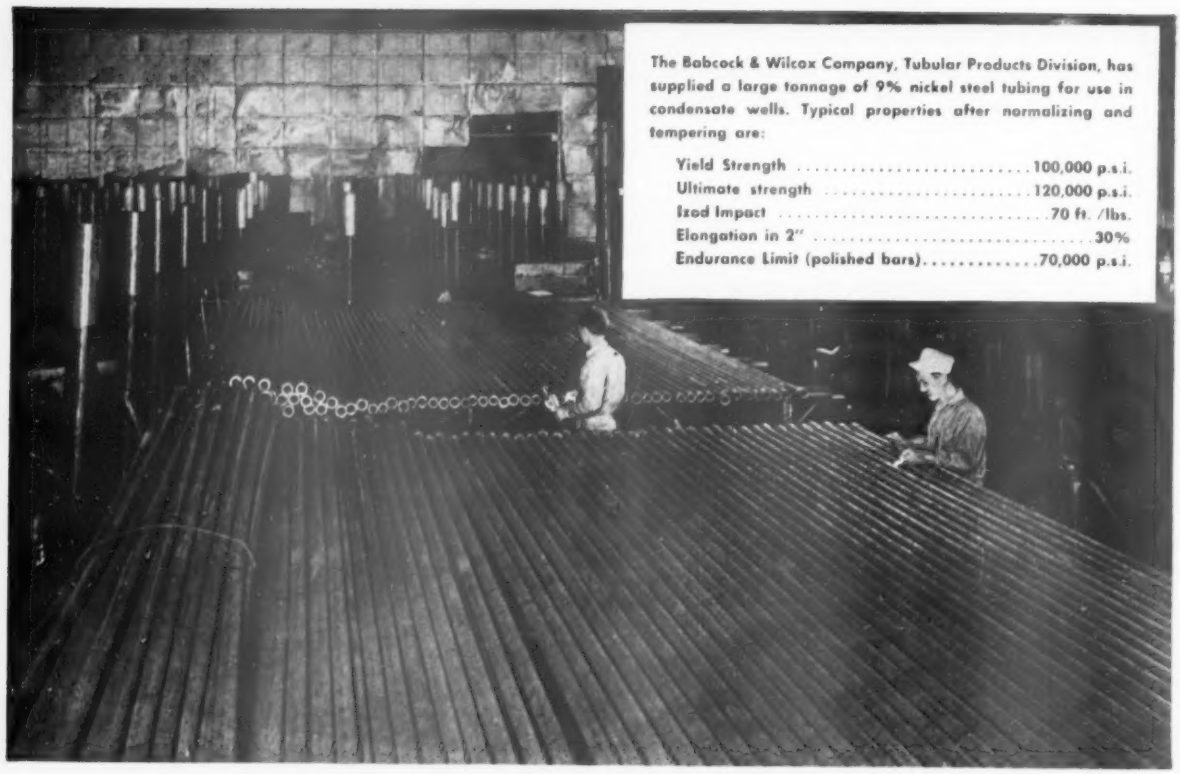
GASOLINE price cutting is common in many parts of the country today and is bound to spread if distress stocks increase. In some places gasoline prices are down to last year's level although refiners are paying 25 cents per barrel more for crude. It appears that technological improvement has run ahead of business horse sense.

If only refiners suffered from price cuts, the attitude might be that it "serves 'em right". But if this reflects back in a cut in crude prices it will slow down discovery and development of new reserves. The producing division of the industry has fairly well tailored its output to current demand and is reconciled to carrying some idle excess capacity. The refining division must do the same.

MANY other industries are currently undergoing inventory readjustments. The refining industry should do this immediately, and do it through the individual foresight and action of each refiner. The threatened collapse of the market can be avoided if every refiner will:

- Stop making so much gasoline as long as stocks keep climbing—by shifting yields or cutting crude runs, or both.
- Prepare—both physically and financially—to carry heavy gasoline stocks well into next summer's motoring season.

The only alternative is for producers to put a squeeze on refiners by keeping down their supply of crude. Crude stocks are no longer very excessive, but apparently refiners are hell bent on running every barrel of crude they can get, regardless of demand for products.



The Babcock & Wilcox Company, Tubular Products Division, has supplied a large tonnage of 9% nickel steel tubing for use in condensate wells. Typical properties after normalizing and tempering are:

Yield Strength	100,000 p.s.i.
Ultimate strength	120,000 p.s.i.
Izod Impact	70 ft. /lbs.
Elongation in 2"	30%
Endurance Limit (polished bars)	70,000 p.s.i.

Corrosion-Resistance and High Mechanical Properties

Characterize B&W Nicloy-9 Oil Well Tubing

Economy calls for oil well tubing which suffers *least* from corrosive conditions.

Exhaustive tests prove that Nicloy-9, a product of The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa., is highly resistant to attacks by the fluid from condensate wells. Moreover, the high strength of this material has made it a logical replacement for N-80 tubing.

Actually, Nicloy-9 first attracted attention by its excellent impact values at sub-zero temperatures down to –320° F.

As a result of its superior mechanical properties, together with its excellent resistance to corrosion, this low carbon 9% nickel steel is also being used . . . more and more . . . as a sucker rod material for corrosive wells. Its corrosion-resisting properties also aid materially in preventing accelerated fatigue failures.

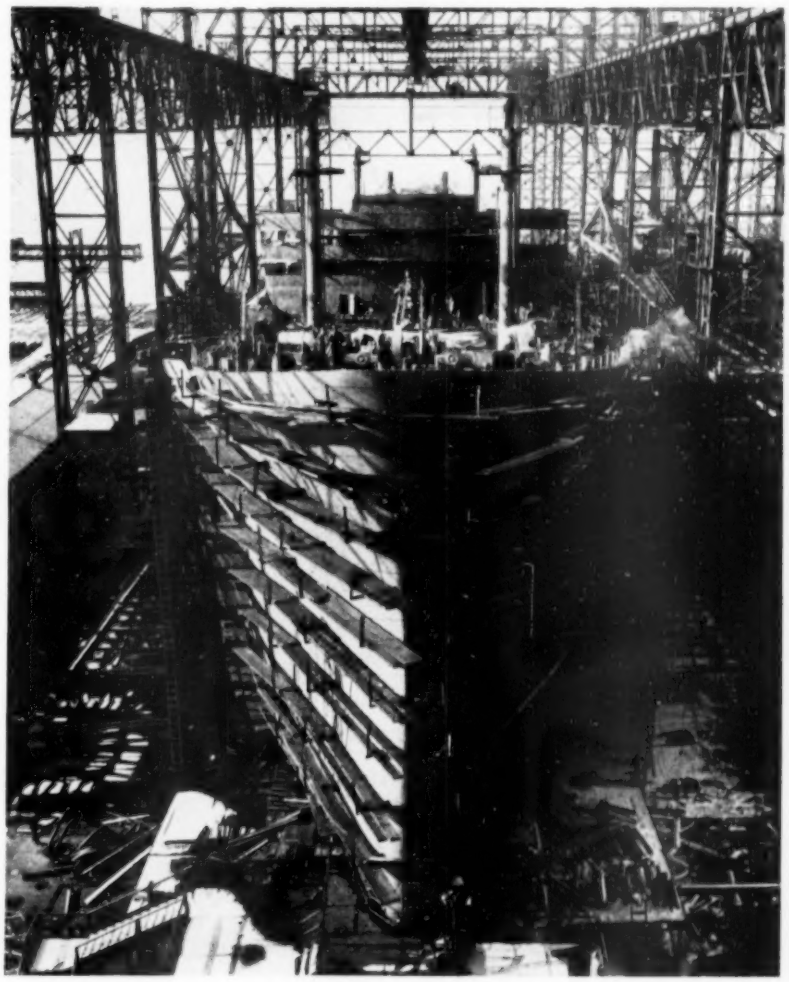
Technical data on B&W Nicloy-9, as well as similar information on Nicloy-5 and -3½, is given in B&W Technical Bulletin 18, copies of which are available on request to The B&W Company, Tubular Products Division, Beaver Falls, Pa.

When you need a metal with extra qualities to assure dependable performance, less maintenance and fewer replacements, think of nickel-alloyed steels. Send us details of your problems for our suggestions.

INCO

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

THIS WEEK... ...IN THE NEWS



LATEST ADDITION TO TANKER fleet of Tide Water Associated Oil Co. is the Flying-A-New York launched this week at Newport News, Va. The 27,000-ton tanker's geared turbine-drive single bronze propeller will give it an average speed of 17 knots loaded. The new tanker joins an already record-size world tanker fleet (see International) at a time when 926,000 d.w. tons of U. S. tankers are idle because of reduced cargoes. (See page 65.) This mammoth will be dwarfed next week when the world's largest tanker will be launched at Quincy, Mass., to join the fleet of Stavros Niarchos, independent fleet owner. The Niarchos tanker, as yet unnamed, will be 45,000 tons, exceeded in size only by the world's five largest passenger vessels.

GOVERNMENT—Five U. S. majors go back to London to resume talks with three European companies on problem of marketing Iranian oil with the blessing of Atty. Gen. Herbert Brownell. . . . The majors, leery of an antitrust action, insisted on Justice Department clearing before completing discussions. . . . ¶Supreme Court is told Alabama and Rhode Island have no legal standing for their suits attacking constitutionality of the "tidelands" act. . . . Officials of Texas, California, and Louisiana join the Justice Department in opposing the two states' action. . . . ¶Atomic Energy Commission issues regulations covering uranium leases on western public lands already covered by oil and gas leases. . . .

INTERNATIONAL—Iraq Government seeks bids for its 1955 royalty oil. . . . Preference to be given to bidders offering scarce currencies, announcement says. . . . Amount offered is 28,500,000 bbl. over next year. . . . ¶Conorada obtains 72,000-sq.-mile concession in western desert area of Egypt. . . . Company, owned by Continental, Ohio, and Amerada, agrees to spend $8,000,000 on exploration in first 6 years. . . . ¶First Russian oil shipment under Russo-Argentine trade agreement scheduled to arrive this month in Buenos Aires. . . .

EXPLORATION—Shell recovers oil and gas-cut mud in Black Mesa basin wildcat. . . . Shows are first indication of possible production in Arizona portion of basin, although production is found in Utah. . . . ¶Record lease sale in Canada indicates new Pembina field is considered a major reserve by industry. . . . Top price of $13,000,000 paid by Texaco Exploration for 92,160-acre reservation northwest of present Pembina producers. . . . ¶Phillips to appeal to Circuit Court recent decision holding invalid the unit clause found in most standard lease forms. . . .

REFINING—Spencer Chemical Co. places on stream world's first ammonia plant using partial-oxidation process. . . . ¶First catalytic reforming unit using Union Oil Co.'s new process, Hyperforming, to be built by Calstate Refining Co. near Signal Hill. . . . ¶Record inventories of gasoline, together with certainty they will climb even higher in next 6 weeks, threaten refiners with possible price cuts or expense in maintaining inventories until heavy-demand season. . . . ¶Cities Service lets $200,000 contract for cathodic protection at Lake Charles. . . .

ACTIVITY—Production of crude and lease condensate averaged 6,270,300 bbl. daily for week ended January 30, down 24,000 bbl. daily. . . . ¶Total well completions decreased 62 wells to 1,045 for the week compared with 855 for same week last year. . . . ¶Wildcat completions were off 39 wells to 192. . . . ¶Rotary rigs operating in the United States totaled 2,461 on February 1 compared with 2,366 a week earlier and with 2,463 on the same date last year. . . .

TRENDS—For the 20-week period ended January 30, refinery runs in 15 out of the 20 weeks averaged less than a year earlier. . . . ¶Distillate production was down from last year in 17 of the 20 weeks. . . . ¶Gasoline production was above last year for every week out of the 20. . . . Weekly production of gasoline has not dropped below same week of previous year in over 12 months. . . .

Record-breaking inventories may mean . . .

Lower Realization for Refiners

John C. Casper

THERE'S a record-breaking over-supply of gasoline in storage in the industry, and it may portend price cuts in the near future.

Primary stocks of finished and unfinished gasoline at the end of 1953 amounted to about 23,000,000 bbl. more than at the end of 1952. If inventories follow their normal trend, they'll total more than 180,000,000 bbl. by the end of March.

This would indicate that refiners have three choices:

. . . **Cut gasoline production,** by charging less crude, reducing their gasoline yields, or both.

. . . **Accept the prospect** of even higher gasoline stocks and start planning to handle the tremendous volumes, even if it means higher costs from financing inventories until the heavy-demand season or from leasing additional storage.

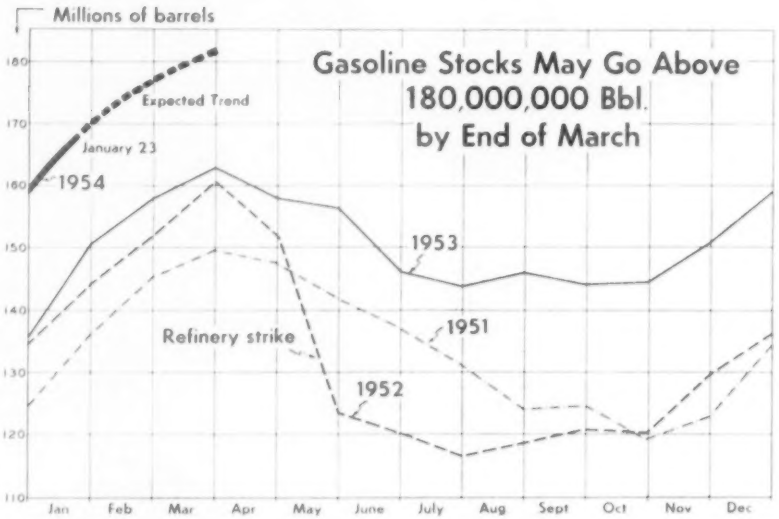
. . . **Expect dumping** of product and resulting price cuts.

For the past 2 years the trend has been toward higher and higher gasoline yields and higher inventories. The result of this abnormal situation has been scattered price cuts this winter, with the period of highest gasoline inventories yet to come.

Gasoline stocks had reached 167,781,000 bbl. by January 23 or 3,050,000 bbl. more than at the end of March last year. Gasoline inventories normally reach a peak about the end of March and the end-of-March figure last year represented an all-time high. New records will be established weekly between now and the time stocks reach the seasonal peak.

Trend in yields . . . The trend toward very high yields of gasoline was very much in evidence even in 1952, but the refinery strike in June of that year held total refinery runs to such a low level that the total increase in gasoline stocks for the year was only a little over 1,100,000 bbl.

Yields of gasoline were above 43 per cent for every month of the last half of 1952 and reached 43.9 per cent in each of 3 months. To meet the needs for heating oils under normal weather conditions, refiners increased the combined yields of kerosine and distillate fuels from an average of 25.7 per cent in 1951 to 26.7 in 1952. Production of residual fuel from a barrel of crude decreased.



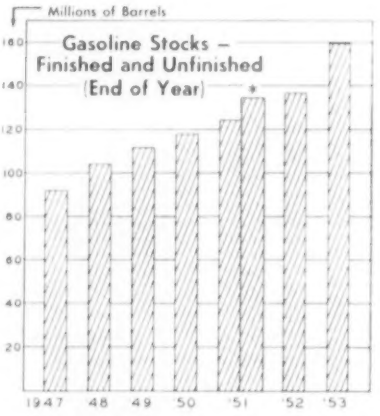
Weather in the 1952-53 winter was warmer than normal and suppliers had an excess of heating-oil stocks at the end of the season. Refiners started a further shift toward production of more and more gasoline from a barrel of crude. January 1953 was the only month of the year with gasoline yields under 44 per cent. The average for the year was about 44.9 per cent compared with 43.0 per cent in 1952 and with 42.4 per cent in 1951.

Trend in stocks . . . The line chart at the top of the page shows the buildup of gasoline inventories during 1953 compared with 1951 and with the abnormal year 1952.

It will be noted that there was very little decline in gasoline stocks after June and that stocks actually increased over 2,000,000 bbl. in August. Gasoline inventories decrease between 15,000,000 and 20,000,000 bbl. in the June - November period of a normal year. In 1953, the low point after January came in July with a reduction of only a little over 2,000,000 bbl.

The small chart of gasoline stocks by years shows the abnormal increase for the year compared with other postwar years. More terminal stocks have been included in total inventories since 1951.

Kerosine and distillate stocks also increased in 1953, not so much from overproduction as from abnormally low

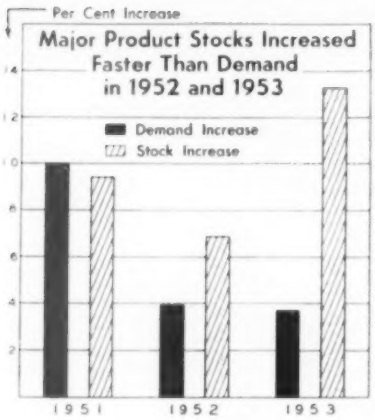


*Stocks were on a new basis after 1951. This 1951 total is comparable with later years.

demands in the first quarter of the year and in the first 2 months of the last quarter.

The result of the combined increases in gasoline and middle distillate inventories was a gain of 13.2 per cent in major product stocks in 1953 compared with an increase of 3.7 per cent in total demand for these products. The comparison chart also shows that stocks increased 6.8 per cent in 1952 when demand gained only 4.0 per cent.

Little being done . . . Weekly refinery figures, reported by American Petroleum Institute, indicate that refiners have done little in the last 2 months



to cut down the rapid accumulation of gasoline stocks. Total gasoline stocks on January 23 were 14,000,000 bbl. greater than on December 19 and were up 22,000,000 bbl. from the corresponding date a year earlier.

The other table on gasoline trends definitely points to lack of remedial action on the part of refiners. For the 9-week period ended January 23, refinery runs averaged 7,004,000 bbl. daily or only 1.6 per cent less than the average for the midsummer period of June, July, and August.

Refinery production of gasoline was cut back even less. The average for the June-August period was 3,548,000 bbl. daily and the reduction to 3,518,000 bbl. daily for the past 9 weeks represents a decrease of only 0.8 per cent.

The ratio of gasoline produced at refineries to total crude runs was 49.9 per cent in the June-August period but had increased to 50.2 per cent for the 9-week period ended January 23. Refiners were turning out more gasoline per barrel of crude run in the recent winter period than they were at the height of the motoring season. (The ratio of gasoline output to crude runs is used instead of actual percentage yields since accurate data on amounts of natural gasoline blended are not available on a weekly basis.)

Compared with last year, refiners have leaned even more toward gasoline production. Crude runs in the past 9 weeks averaged 10,000 bbl. daily or 0.1 per cent less than in the same weeks a year ago. On the other hand, gasoline production was up 3.8 per cent.

Prices are off . . . The end result of the abnormal accumulation of gasoline stocks has been cuts in gasoline prices.

Socony-Vacuum Oil Co. announced a reduction of 0.2 cent a gallon in prices for regular gasoline, effective January 29 for northeastern states. Esso Standard Oil Co. met the cut with a reduction in 11 Atlantic Seaboard states from Maryland to Maine.

This reduction is the third for the northern part of the East Coast since the first of November, for a total cut of about 0.7 cent a gallon.

Regular gasoline on the Gulf Coast is no higher now than it was a year ago and it may go lower under the influence of a weak market on the East Coast. Crude advanced 25 cents a barrel last June.

Most Mid-Continent suppliers have a formal Group 3 quotation of 11.0 cents a gallon for regular gasoline. In a strong gasoline market, pipe-line gasoline was worth 0.5 cent over the low plus pipe-line transportation charges. Some pipe-line gasoline has been moving in recent weeks at 10.5 cents plus transportation. Reports indicate that a large volume of regular would be available at 0.25 cent under.

Outlook . . . Distillate stocks have been reduced in recent weeks until current stocks are only about 2,000,000 bbl. greater than last year. If the weather is no colder than normal for the next 2 months, refiners probably can meet distillate demand without a major increase in runs by shifting to higher distillate yields. But, even reduced refinery runs and lower gasoline yields will still add to gasoline inventories.

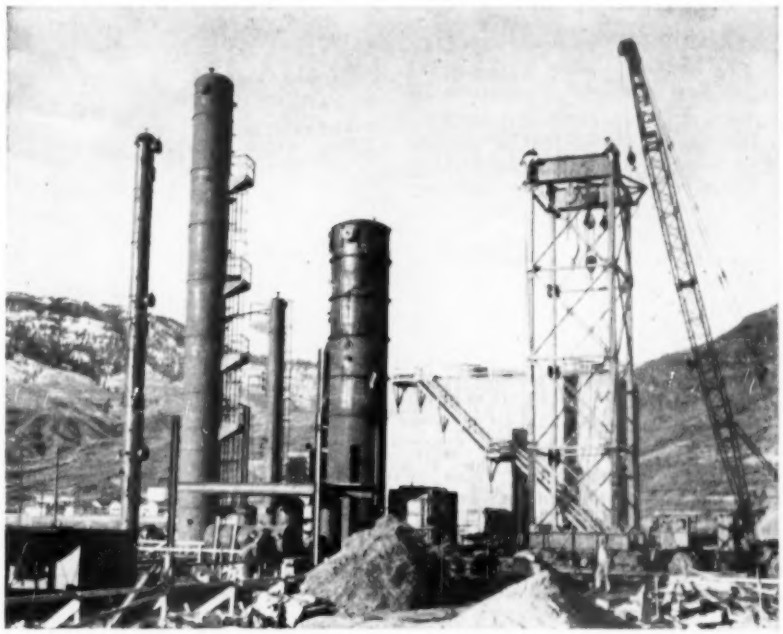
Refiners will have to "live with" excessive gasoline stocks until the surplus can be worked off during the coming motoring season. Adjustments in runs and yields during the summer months can bring inventories down to manageable levels by next heating season.

GASOLINE STOCKS
(Thousands of barrels)

	Stocks Jan. 23, 1954	Increase over Dec. 19, 1953	Increase over Jan. 24, 1953
Dist. 1	39,214	1,765	1,810
Dist. 2	55,331	6,266	4,538
Dist. 3	45,245	3,752	8,980
Dist. 4	6,655	1,289	1,097
Dist. 5	21,336	1,123	5,477
Total U. S.	167,781	14,195	21,902

GASOLINE TRENDS
(Thousands of barrels daily)

	Refinery runs	Gaso. prod.	Gaso. demand
9 weeks ended 1-23-54	7,004	3,518	3,314
June-July-August 1953	7,116	3,548	3,760
Per cent change fover last summer	—1.6	—0.8	—11.9
9 Weeks ended 1-24-53	7,014	3,389	3,130
Per cent change over same period a year earlier)	—0.1	+3.8	+5.9



Kamloops Refinery Moving Ahead With Construction

Crude-oil distillation towers rise at the Kamloops, B. C., refinery being built for Royalite Products, Ltd., subsidiary of Royalite Oil Co., Ltd. Process facilities will include a 1,450-bbl. Universal Oil Products Co. fluid catalytic cracker, a U.O.P. 100-bbl. catalytic polymerization unit, a 2,000-bbl. vacuum distillation unit, and a gas-concentration unit. The refinery will charge 5,000 bbl. daily of virgin crude oil to atmospheric distillation facilities. Crude will be obtained from the Trans Mountain line through a 12-in. takeoff.

AT THE OPENING of Spencer Chemical's new Vicksburg Works. Observers include Wynkoop Kiersted, Jr., process-division manager of Texaco Development Corp.; N. S. Whitaker, Vicksburg production superintendent; R. F. Brown, Spencer general works manager; and P. C. Keith, Hydrocarbon Research, Inc.

PLANT GOES ON STREAM as Kenneth A. Spencer, president of Spencer Chemical Co., turns the valve to start production in the company's new ammonia plant. Looking on beside Spencer is F. L. Pyle, who is works manager of the new Vicksburg facilities.

Unique Ammonia Plant Opened

Spencer Chemical's petrochem plant is world's first to use partial-oxidation process for ammonia manufacture

John C. Reidel

VICKSBURG, Miss. — The world's first ammonia plant to employ partial oxidation of natural gas went on 24-hour production here last week.

The plant is the $14,000,000 facility of Spencer Chemical Co. It was formally opened with a briefing and tour conducted by company officials for the industrial press.

Attention of the petrochemical industry has been focused on the new plant for several reasons:

... **It utilizes** automatic control to an unusually high degree.

... **It is compact** in layout.

... **Arrangement of facilities** and the degree of outside construction make it unique in the ammonia industry.

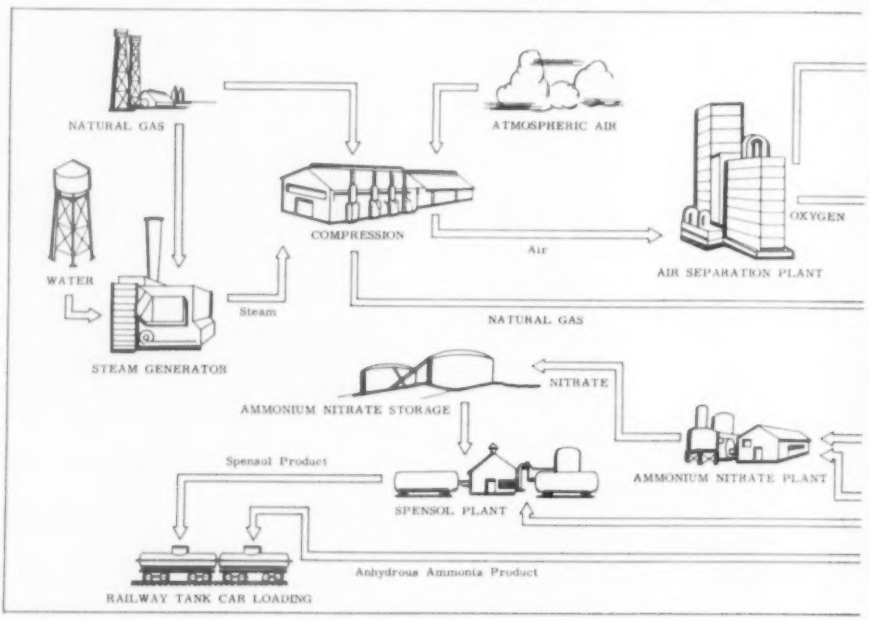
The partial oxidation method to make hydrogen has been carefully tied in with Spencer design features in the ammonia synthesis section to obtain savings in initial investment and in operating costs.

Beyond this, major advantages accruing from the use of the partial oxidation method appear to be in its flexibility with respect to type of feedstock employed as well as in choice of products to be manufactured. This provides more than one ace in the hole for the petrochemical manufacturer desiring to expand his operations.

What is outstanding ... "The outstanding feature of this new works is its high degree of process coordination," Kenneth A. Spencer, president of the company, says.

"Because the plant design is simple and the layout compact, and because extensive use is made of automatic controls, the operating force will be about one-third of the size required for a conventional ammonia plant of similar capacity."

Traditionally, ammonia plant design has tended toward spreading the process steps out, making a separate unit of each step. The Spencer Vicksburg plant, however, is a highly integrated one, making it easier to operate.



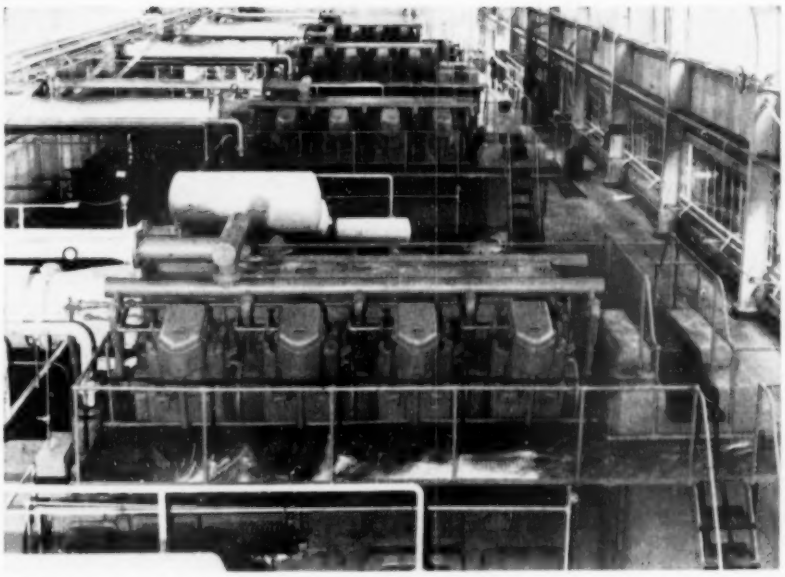
Only 110 people are employed at Vicksburg, including office personnel, janitors, etc. Only eight operators, a supervisor, and assistant supervisor are used on each shift, while conventional plants of this capacity require 25 to 30 on each shift. Design also involves reduction in the number of compressor units, with higher concentration of horsepower per unit.

The Vicksburg plant has been designed with a basic capacity of 210 tons of anhydrous ammonia. Other process facilities have been installed to make 110 tons of nitric acid, 140 tons of ammonium nitrate solution, and 350 tons of "Spensol" (ammoniating solutions) per day.

With the partial oxidation method now operating commercially on natural gas and also apparently available on a commercial scale for operation with heavy-oil feed, such as residual fuel oil, the operator can turn to either type of feed stock, as the situation warrants.

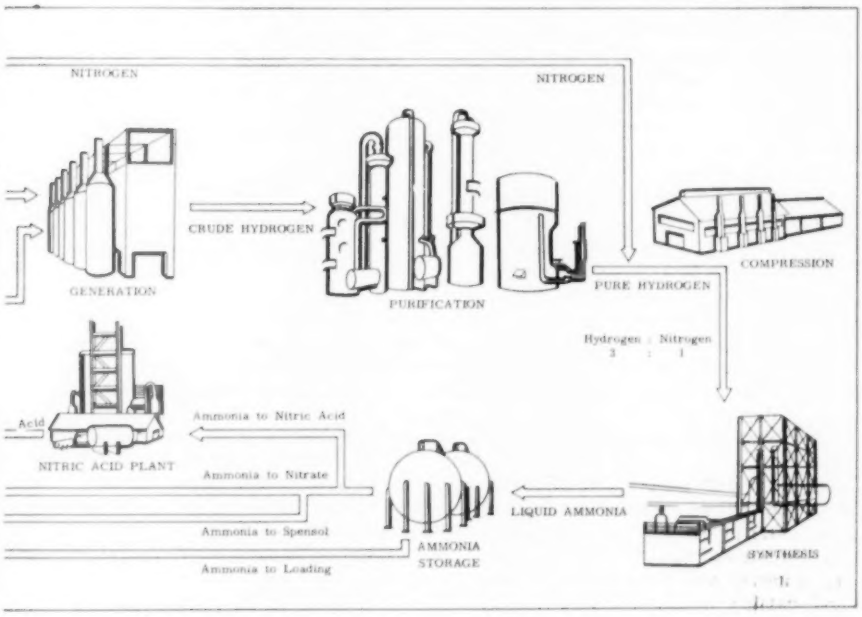
Product-wise he is in a position to employ the partial oxidation method for making ammonia or to expand his operations to the manufacture of methanol or even acetylene. Still other possibilities are perhaps now under study and may, in the near future, be developed to commercial feasibility.

Natural gas . . . At present Spencer uses natural gas to make the hydrogen required for ammonia manufacture. Availability to the plant of a major supply of natural gas, backed by large gas reserves, was one of the prime factors in Spencer's selection of Vicksburg as the plant site.



THIS EQUIPMENT compresses process streams, such as natural gas, synthesis gas, and nitrogen. Natural gas and air are the plant's raw materials.

FIRST TANK CAR loaded out of the plant. In the picture are W. P. Peterson, F. L. Pyle, J. A. Woodside, Robert Byorum, N. S. Whitaker, and S. P. Horkowitz, all with Spencer Chemical.



Natural gas for process and steam generation is purchased from United Gas Pipe Line Co. The plant uses between 12,000,000 and 15,000,000 cu. ft. of natural gas per day. Roughly 9,000,000 to 11,000,000 cu. ft. is required for process and the remainder for utility use.

Air . . . The other raw material is air. Spencer liquefies about 1,000 tons of air per day in the air-separation plant which operates at temperatures going down to —300° F.

Oxygen and nitrogen are separated by fractionation of the liquid air. The oxygen (95 per cent pure) and natural gas are fed to the six partial oxidation gas generator units.

Components other than hydrogen are removed from the synthesis gas. Nitrogen (99-plus per cent pure) is employed in the final step of the purification process. Additional process nitrogen from the air separation plant is

furnished in the correct proportion to make ammonia.

The oxygen, following fractionation from nitrogen, is removed from the distillation column in the liquid state with a centrifugal pump. This eliminates the difficulties encountered when attempting to compress oxygen gas to the pressure (about 350 psig.) required for the partial oxidation step.

The oxygen is heat-exchanged with warm inlet air and is gasified on its way to the generators. The inlet air has been filtered, compressed to 125 psig. by a centrifugal compressor and further compressed to 600 psig. by each of two 2,000-hp. gas-engine-driven reciprocating compressors. These are part of a central compressor power unit handling three flows—air, natural gas, and nitrogen. The inlet air, after heat exchange, is further cooled through the use of expansion valves and a turboexpander and is eventually liquefied.

Making hydrogen . . . The natural gas is compressed in each of two reciprocal compressors of the central compressor power unit handling the three process flows.

After preheating in a fired heater the natural gas undergoes controlled burning with oxygen in the gas generators. The methane is consumed down to 0.2 or 0.3 per cent. The mixing and burning are accomplished by a specially designed burner set in each partial oxidation unit. The resulting gas, high in hydrogen and carbon monoxide content, goes to shift conversion in which the carbon monoxide is changed to carbon dioxide and more hydrogen.

Purification . . . Carbon dioxide is removed by contacting with M.E.A. (monoethanolamine) solution followed by a caustic solution wash. Final purification is by liquid nitrogen wash to remove traces of carbon dioxide, carbon monoxide, methane, and other inerts.

It will be noticed that use of copper ammonium formate or acetate solution for removal of carbon monoxide has been eliminated. This is made possible by the composition of the gas obtained when using partial oxidation and by employment of the nitrogen wash.

The pure nitrogen evaporates and leaves the nitrogen wash tower with the hydrogen. Content of nitrogen in the process stream now amounts to about 10 per cent.

This nitrogen came as a gas from the air separation plant and went through centrifugal compression and reciprocal compression in the gas-engine-driven central installation handling the three flows.

A portion of the nitrogen was then returned to the air plant for liquefaction to be used in nitrogen wash. The remainder is added as nitrogen gas to the stream leaving the nitrogen wash tower, resulting in ammonia synthesis gas with a three-to-one mole ratio of hydrogen to nitrogen.

Making ammonia . . . Spencer design calls for ammonia conversion at a pressure of 3,600 psig. Ammonia formed in each pass through the converter is separated from the uncombined hydrogen in a water cooler and refrigerated cooler-separator.

The unreacted gases are recompressed back into the synthesis loop as recycle by the circulator. This is a nine-stage centrifugal compressor of German manufacture driven by an inline electrical motor. Oil contamination of the ammonia is minimized, since this compressor requires very little oil lubrication.

Other processing . . . This consists first of all in burning ammonia with air and absorbing the resulting nitrogen dioxide in water under pressure to form 60 per cent nitric acid. The nitric acid is combined with liquid ammonia to make ammonium nitrate solution. "Spensol" ammoniating solutions are produced by blending liquid ammonia, ammonium nitrate solution, and water in a specially designed mixer.

The new ammonia plant was designed by Spencer Chemical Co. and was constructed by Quaker Valley Constructors, Inc., a wholly owned Spencer subsidiary. Foster Wheeler Corp. was retained as engineer and constructor for specialized portions of the work. The tonnage oxygen plant was furnished by Air Products, Inc.

The partial oxidation process is the result of extensive research and development by Texaco Development Corp. and Hydrocarbon Research, Inc., both of which own basic patents and are licensors of the process.

Advice on Instruments:

Set up evaluation program for new or planned additions, Du Pont expert tells 400 engineers at annual symposium

G. L. Farrar

COLLEGE STATION, Tex. — Process plants need an instrument-evaluation program to determine two things: Whether new types of equipment could do an existing job better, and, whether new equipment could perform tasks not being handled by equipment now installed.

This was the principal theme of W. A. Crawford, E. I. du Pont de Nemours & Co., Wilmington, Delaware, as he addressed the Texas A. & M. College ninth annual instrumentation symposium here. The meeting, sponsored by the A. & M. chemical engineering department, was held January 27-29. About 400 instrument engineers were in attendance.

In the Du Pont company there are six separate types of instrument evaluations, Crawford said. These are design evaluation, visual inspection, performance evaluation under ideal conditions, performance evaluation under nonideal conditions, performance evaluation during plant test, and performance evaluation during plant use.

Design evaluation . . . This evaluation is made by an application engineer from data in the form of manufacturers' reports and tests, blue prints showing cutaway views of the instrument, and catalog literature on the instrument. These points are examined closely:

. . . What are the limitations of its application? Is the design flexible enough to be used for more than one application?

. . . What are its principles of operation? Are the friction forces expected to be small compared with the total working forces? Is it null balance?

. . . Is corrosion-resistant construction used?

. . . Is it suitable for outdoor use; of rugged, simple design; easy to install and maintain?

. . . Are the expendable parts inexpensive?

. . . Does it satisfy "code" and legal requirements for safe use?

. . . How many of these units have been made, and how many have been used?

Visual inspection . . . After the design evaluation, an instrument is obtained for visual inspection if it shows promise. The application engineer evaluates these points, after careful examination of the instrument:

. . . Does it have good workmanship?

. . . Is it easily assembled and taken apart? Can it be done by one man? Must he have special skills?

. . . Are its visual features effective? Can it be easily read or interpreted?

. . . Is its weight or mass of moving

parts so excessive that it may hinder rapid response?

. . . Are all the factors determined in the first evaluation still reasonable?

Ideal performance . . . The third type of evaluation is carried out by a quick shop test of the unit in operation. Points determined during this test are:

. . . Does the unit perform the duties it is expected to accomplish?

. . . Is it sufficiently sensitive in its response to a small change in signal?

. . . Is the range span correct?

. . . Will it follow a rapidly changing signal?

. . . Are there any mechanical or electrical weaknesses noted in its operation?

. . . Does it produce absolute or relative values of measurement?

. . . Is the unit tested a production-line unit or a model-shop unit?

Nonideal performance . . . Plant operating conditions are seldom ideal, and instrument weaknesses not apparent during ideal conditions may show up during day-to-day operation, Crawford said. For that reason more detailed tests may be carried out to evaluate the instrument under conditions to be expected in plant application. Points determined in this test are:

. . . As-received calibration.

. . . Power consumption; error due to fluctuation in power supply (this may be fluctuation in air pressure, or fluctuation in voltage on an electrical system).

. . . Effect of ambient temperature change; effect of ambient pressure change.

. . . Effect of vibration on performance.

. . . Effect of case distortion or distortion by piping connections.

. . . Hysteresis and dead spots found in calibrations.

. . . Drift at constant input over long period of time; effect of over-ranging input.

. . . Life expectancy tests and frequency response tests where necessary.

. . . Other tests, such as corrosion, erosion, strength of materials, etc.

Plant test . . . The next step in evaluation is to install the instrument in a typical plant application. The installation should be one which requires maximum performance, Crawford said. The test should be followed closely by the applications engineer, and a full record of results should be kept. Points to be determined by this test are:

. . . Does it perform well in actual installation under nonideal conditions, such as with dirty air supply, in freezing weather, etc?

. . . Does it drift periodically? Why?

. . . Can it be calibrated, adjusted, and maintained easily?

. . . Does piping strain affect it?

Plant use . . . The final evaluation to be given the equipment is that of installing units in plant service. While many people feel that this period of operation can no longer be considered a test, there are still many factors that should be determined before the unit can be rightfully considered suitable for unlimited service, Crawford said. Performance of the various instruments in plant-use test should be evaluated on the basis of these points:

. . . Can semiskilled maintenance people maintain it?

. . . Does it satisfy a wide range of application?

. . . Does it perform as expected under these various applications?

. . . Are maintenance costs high?

. . . Is it reliable?

When evaluating a specific instrument, it may be found that one or more of the six steps can be omitted. The testing procedure under these circumstances should of course be adapted to requirements of the instrument and its proposed application.

I.P.A.A. Opens for Business in New Quarters

C. E. Buchner, executive manager of the Independent Petroleum Association of America, opens the door of the association's new national headquarters building in Tulsa for Bob Korte, advertising manager, and Mrs. Gertrude Decker, member of the staff of the Independent Monthly. The new headquarters has 10,000 sq. ft. of floor space, is air conditioned, and was designed specifically to serve the activities of the I.P.A.A. The building fronts 103 ft. on Boulder Avenue and is directly across the street from the association's old headquarters, located on a site where Skelly Oil Co. plans to erect a new office building.

Swaim Named Sales Manager

PITTSBURGH.—M. E. Swaim has been appointed general manager of oil-field sales for National Supply Co., Pittsburgh. He succeeds T. J. Walne, who resigned.

M. E. SWAIM

Swaim joined the company in 1925 in Tulsa, serving later in sales and engineering capacities in Wichita, Kans., and Clay City and Olney, Ill. He spent 2 years in the engineering department of the company's Toledo plant and in 1944 was appointed manager of the plant-products division in Houston. He was appointed sales manager for production equipment in 1948.

National Supply is one of the world's largest manufacturers and distributors of oil-field machinery and equipment. In addition to offices in principal cities, the company operates 118 supply stores throughout the oil country of United States and Canada.

Legal Battle Shapes Up

Phillips to appeal Utah decision holding unit clauses void in case that could threaten all long-term leases

DENVER.—The Tenth U. S. Circuit Court of Appeals will be asked this month to overrule a Utah federal judge's decision which poses a threat to all long-term oil and gas leases.

Attorneys for Phillips Petroleum Co., Bartlesville, Okla., said last week they will appeal the decision which holds invalid the unit or pooling clause found in most standard lease forms.

U. S. District Judge Willis Ritter not only ruled the unit clause "too indefinite and uncertain" to be enforceable, but added that it violates the "rule against perpetuities." The decision strikes at the very basis of a lease which is good as long as there is production from the land involved.

While Judge Ritter's decision is directed principally at the almost universally used unit clause, the implications of the ruling are broad enough to create a serious question of the legality of any long-term oil and gas lease.

How it came about . . . The case was originally filed in Judge Ritter's court in an effort to smooth the way for a field-wide unitization agreement for Roosevelt pool in Uintah County, Utah. Several companies attempted to set up the unit with Carter Oil Co. as the operator.

Phillips tried to include in the agreement a lease obtained from Heber A. Peterson, but Peterson objected.

The lease involved is the standard lease form used throughout the Rocky Mountain area, Mid-Continent and Southwest. One clause gives Phillips the right to unitize the lease with any other lands in an agreement approved by the government. Peterson was one of 86 fee owners of land involved who objected to the proposed 34,000-acre exploratory unit. Another 745 owners agreed to the unit.

Judge Ritter's decision was apparent last June when he indicated his ruling orally from the bench. Since that time attorneys have reargued the case and submitted briefs.

The formal decision was handed down January 5 in the court's findings of fact and conclusions of law, but the protests of attorneys delayed actual entry of the decision until January 22. The court did not hand down a written opinion and Phillips has 30 days in which to file its appeal.

The unit clause . . . The clause to which Judge Ritter objected is a virtually standard provision of the "Form 88" lease used with minor variations by almost all oil companies.

In public land states, as in this case, the clause usually refers to governmental approval because a federal agency must approve unit agreements involving leases on public lands. The unit clause is used primarily in these cases to form large blocks for exploration purposes.

In other areas it is used to assemble small tracts of land into single 20 or 40-acre drilling units or to bring royalty owners into a field-wide operating unit.

Possible effects . . . The rule against perpetuities is a common-law principle usually invoked against any attempt to govern the actions of people or estates in future generations by specific bequests in wills. For example, it would prohibit restrictions on an estate for a period longer than the life of an heir plus 21 years.

Attorneys say the question of perpetuity has apparently never before been raised against conventional oil and gas leases in states where they have been in use for many years. Until this case, oil operators and royalty owners have accepted the necessity of having lease agreements that last for the life of a productive field and give operators broad powers to produce the property in the manner they consider best.

Since oil and gas leases customarily are good for as long as there is production and since an oil field might produce for 50 or 100 years, the effects of the Utah decision could be widespread if the case is upheld.

East Coast's First Catformer on Stream

This 12,000-bbl. per day catforming unit is the first of several major new processing units to go on stream at the Philadelphia refinery of Atlantic Refining Co. The unit is the largest of its type and employs a platinum catalyst developed in Atlantic's Research and Development Laboratories located adjacent to the refinery. The plant is producing high octane blending stock for motor fuel and aviation gasoline. The three reactors contain 40,000 lb. of catalyst, of which 2,680 oz. are platinum, worth about $250,000. Plans and specifications for the unit were prepared by Stone & Webster Engineering Corp. of Boston which constructed the plant in accordance with the design furnished by Atlantic's engineers. The Catformer is the first unit to be completed in a $50,000,000 expansion program at the refinery. Nearing completion are a 50,000-bbl. crude unit, a 45,000-bbl. Orthoflow fluid catalytic cracking unit, a 3,500-bbl. alkylation unit, and a synthetic ammonia plant with an output capacity of 100 tons a day.

New Steels Coming

New products to help oil industry, trade press told

HOUSTON.—New developments of the steel industry, either proven or now being tested, may have great effects on the petroleum industry, Dr. J. B. Austin, director of research for United States Steel Corp., said here last week.

In an interview with members of the trade press, Austin said these advancements may contribute much to oil operations:

... **Aluminum-clad steel,** which is already replacing to some extent galvanized steel as a means of combating corrosion. The possibilities here for drilling and production are limitless, although aluminum-clad steel is now confined mostly to sheeting applications.

... **New alloys** which can withstand temperatures up to 1,500° F. for refining and petrochemical processes. These are now in production, and the industry is working on alloys which can withstand temperatures up to 1,800° for petrochemical applications.

... **Tubular steel** which can stand great temperature variations and which can be used in pipe-line construction in extremely cold climates.

... **Steel pipe** coated and lined with plastic, which can handle corrosive fluids at high pressure.

Austin said it is expected that research eventually permit application of the aluminum-clad steel to structural shapes, offshore pilings, and other oil-industry needs.

The research head said every major steel producer is looking closely into the field of plastic-pipe manufacture, although plastic pipe is now limited in application by its inability to withstand high pressures.

Socal Plans Record Outlay

SAN FRANCISCO. — Standard Oil Co. of California has budgeted $275,000,000 for capital expenditures and exploration work this year, an increase of $50,000,000 over 1953.

Nearly two-thirds of the total, or about $175,000,000, will be spent on a stepped-up program to find new reserves and develop production in existing fields, Board Chairman R. G. Follis said.

Abnormally high expenditures also will be made in refining, Follis said, due to the fact that projects begun last year now are in full swing. Projects under way include catalytic reformers at the El Segundo and Richmond refineries, to cost more than $30,000,000; a catalytic cracking unit and other facilities at El Segundo; a phenol plant at Richmond; a $10,000,000 construction program at the Vancouver refinery of Standard Oil Co. of British Columbia; and a $4,000,000 asphalt refinery of American Bitumuls & Asphalt Co. near Cincinnati.

U.S. Tankers Slump

Inactive tankers increase sharply over '52 figures

WASHINGTON. — A serious slump in U. S. tanker activity was reported last week by the American Merchant Marine Institute on the heels of international reports that world-wide tanker tonnage is at an all-time high. *(See International.)*

The merchant marine institute disclosed approximately 926,000 d.w. tons of American tankers are inactive today, a 62 per cent increase over a year ago. Reduced cargoes have put 86 per cent of the idle vessels out of service.

The privately owned U. S. tanker fleet consists of 442 vessels aggregating 6,925,463 tons and represented 21 per cent of the world's tanker tonnage in 1953, according to the institute. (Davis & Newman, Ltd., London, place U. S. total tonnage at 340,000 tons more.)

The American institute disclosed that 15 U. S. vessels of 178,119 tons were scrapped, converted, transferred or otherwise dropped from the listing but 14 new tankers of 329,582 tons were added.

The institute found that in 1953 the only increase in active tonnage was in the coastal and intercoastal area, but amounted to only 64,000 d.w. tons or less than 2 per cent. Tonnage in trade between the U. S. and its territories declined 54 per cent, and runs between foreign countries dropped 32 per cent.

Our present foreign trading fleet represents three times the prewar tonnage, but tanker tonnage operating abroad only has increased 18 times.

The coastal and intercoastal fleet has increased 660,000 d.w. tons over 1939 and the only decrease recorded was a 45 per cent drop in trade between U. S. and its territories since 1939.

Sherry Buys Brundred

TULSA.—William J. Sherry, Tulsa independent, has acquired all the stock of the Brundred Oil Corp., Oil City, Pa.

New officers of the corporation are F. W. Kessler, president; C. L. Sutton, vice president and V. H. Smith, secretary, all of Tulsa. The firm was founded in 1919 by W. J. Brundred who headed the concern as president until its sale.

The corporation owns producing properties in Kansas, Kentucky and Oklahoma.

Industry Briefs

CLEVELAND. — Completion of a 12,000-bbl. per day catalytic reforming unit at the Lima refinery of Standard Oil Co. of Ohio is scheduled for mid-July, according to George H. Watkins, assistant to vice president. Procon, Inc., began work on the $7,500,000 unit last July.

COLORADO SPRINGS, Colo. — Stockholders of Holly Oil Co. and Table Mesa Oil Co. have approved a merger of the two firms effective last week. Holly will be the surviving company. It has production in California, Kansas, and Wyoming and Table Mesa has production in New Mexico, Kansas, and Wyoming.

REGINA.—Mid-Saskatchewan Pipelines, Ltd., is seeking a conservation board permit to build a pipe line from Smiley Viking oil field to connect with Interprovincial Pipe Line Co. at the latter's Kerrobert pump station.

HAMLIN, Tex. — The Texas Co. and Marshall R. Young 1 Lillian C. Drake, Fisher County wildcat 12 miles from here, and northwest of production in Pardue field, has been completed as a Caddo limestone discovery. The well was given a completion potential of 653 bbl. of oil a day from pay at 5,856-74 ft.

LOS ANGELES.—A rig operated by Bell & Burden, Inc., Los Angeles drilling firm, drilled 12 wells in 90 days for a total footage of 69,365 ft., or an average well depth of 5,780 ft. During 1953 the firm set a record with six rigs drilling 314,855 ft. in 48 wells for an average depth of 6,559 ft.

ANDREWS, Tex.—A fire which broke out following a blowout at a Parker Drilling Co. rig about 15 miles southwest of here January 29 was brought under control early last week after causing damage to the rig estimated unofficially at $100,000. The crew was running pipe when the blowout and fire occurred. There were no serious injuries.

Iranian Deal Near?

Five U. S., three European companies resume London talks after American majors first receive Brownell's blessing

ARMED with antitrust clearance from the U. S. Department of Justice, five major American oil companies have returned to meetings in London designed to work out problems connected with the marketing of Iranian oil.

Company officials are participating in the conferences with representatives of three British, Dutch, and French international oil companies — Anglo-Iranian Oil Co., Ltd., Royal Dutch-Shell, and Cie. Francaise des Petroles.

Preliminary discussions were held in London several weeks ago by top executives of these companies and the American firms, Standard Oil Co. (N.J.), Standard Oil Co. of California, Socony-Vacuum Oil Co., Inc., Gulf Oil Corp., and The Texas Co.

Anglo-Iranian announced early last week in London that representatives of the eight companies had returned to London to resume talks on "the internal difficulties in the way of getting Persian oil back into world markets." At the same time, A British Foreign Office spokesman characterized as "very premature" a report that an agreement had already been reached between Iran and Britain.

However, there was widespread optimism over the prospects that an agreement will be reached. In Teheran, talks continued between high officials of the Iranian Government and British diplomatic representatives. Among other matters, these discussions were reported to concern the division of profits from renewed operation of the Iranian oil industry and questions of marketing by the so-called consortium of international companies.

The eight companies meeting in London control all production in the Middle East except the relatively small amount thus far developed by Pacific Western Oil Co. and American Independent Oil Co. in the Neutral Zone. The American participants in the London meetings, however, are the only United States companies with large oil marketing organizations in the Eastern Hemisphere.

Herbert Hoover, Jr., special adviser to the State Department in connection with the Iranian oil problem, has returned to London and has been in touch with both Anglo-Iranian and the Foreign Office. He is understood to be taking part in the new discussions of the companies on the marketing question.

There was no indication whether the participation of these companies would have any effect on the pending "cartel" suit in which they are named as co-defendants. It was the threat of that suit which led the companies to insist that the Department of Justice pass on the plan to help Iran.

Under the department's endorsement, the companies will be permitted to participate in the division of purchases of Iranian oil but a spokesman in the department said they "will be on their own" with respect to their subsequent operations.

This was interpreted to mean the department had not given clearance for any agreement between the companies as to cut-backs in production in other Middle East countries or for the division of world markets.

Attorney General Herbert Brownell, Jr., reportedly gave his limited clearance to the companies at the suggestion of the National Security Council, which was thoroughly briefed as to the situation last month by Hoover.

Since no arrangement for the marketing of Iran's oil could be handled without the participation of American companies and because settlement of the quarrel between Britain and Iran will protect against a possible communist move to get control of Iran's oil, the NSC is said to have agreed the projected arrangement was in our national interest and should be supported.

Details of the clearance given the companies have not been disclosed but it was indicated it is strictly limited to the method of splitting Iranian production between the several companies which will be parties to the agreement.

A provision in the clearance reserves to the Justice Department the right to initiate prosecutions if the companies go beyond the defined limits of the immunity granted them.

The idea of American company participation in a return of Iranian oil to the world market was broached initially by the Truman administration, but former Iranian Premier Mossadegh and the Federal Trade Commission-Justice Department attack on the foreign operations of the companies blocked the proposal.

The Iran situation and the steps taken to solve it have to some extent focused consideration in Washington on proposals that the antitrust laws be limited solely to domestic operations and not extended to cover activities of Americans abroad.

The suggestion was made by Standard Oil Co. (N.J.) last month in a lengthy statement filed with the attorney general's antitrust law study committee, but it also had received the attention of the Randall Commission.

Uranium Lease Rules

AEC can issue permit for mining on oil-lease land

WASHINGTON.—Development permits for uranium reserves staked on public lands covered by oil and gas leases may now be obtained from the Atomic Energy Commission.

Exploitation of uranium was provided by an act of Congress last year creating valid claims on areas staked by prospectors between July 31, 1939, and January 1, 1953. The act has no provisions for uranium discoveries on oil lands after January 1953, but AEC officials say these later discoveries can be exploited by leases secured from the holder of the oil and gas lease, subject to government confirmation.

Mostly affected are the holders of oil and gas leases on the Colorado Plateau, but uranium prospectors are also active in other western states.

The newly issued AEC regulations allow uranium leases on tracts of not more than 1,500 by 600 ft., with a limit of 100 tracts, on a royalty-free basis with an annual $10 rental for each tract.

Leases will run for 5 years and will be renewable for not more than 5 additional periods of 3 years each.

The regulations provide applications may be denied "in the national interest" and the leases granted will compel operations that will not interfere with the lawful operation of any other party having a lease, permit, easement, or other right in the premises.

Randall Report Scored

WASHINGTON.—Adoption of the Randall Commission program for dealing with the problem of foreign trade "would result in a steady deterioration of the domestic petroleum industry and increasing dependency upon foreign

oil." Russell B. Brown, general counsel of the Independent Petroleum Association of America, declared last week.

In a report to I.P.A.A. president W. M. Vaughey, Brown charged the commission with dismissing security considerations as a factor in determining trade policy as to the import of strategic materials and recommending special advantages for foreign investments and continuing encouragement of imports through reduced import duties.

"It pays lip-service to the need for maintaining strong domestic industries, while recommending a contrary course," Brown declared.

Brown asserted the domestic industry had been let down by administration leaders who assured that the problem of excessive oil imports would be fully explored and some solution proposed by the commission.

Seized Leases on Block

WASHINGTON.—Oil rights in California lands formerly owned by enemy nationals and seized by the government during the war are being offered for sale by the Office of Alien Property of the Department of Justice.

Sealed bids, to be opened February 18, are being invited for the leasing of "the right to drill for, mine, extract, remove and dispose of all the oil and gas owned by the Attorney General, comprising an undivided 9/20ths interest" in five tracts in Kern County and three tracts in Kings County, six consisting of one-half and two of one-quarter sections.

The department will accept bids for one or more parcels separately and for all parcels as a unit from American citizens and corporations, and leases will be awarded to the qualified bidders of the highest cash bonuses.

PAD Denies 286 Write-Offs

WASHINGTON.—The government has denied only 286 of the 2,008 applications filed by the oil and gas industry for accelerated tax amortization of new facilities under the defense program.

At the close of 1953, the industry had received approval for quick write-off of approximately 49 per cent of investments of $3,838,440,000 in 1,556 projects.

Also, the Office of Defense Mobilization listed 11 other projects under construction at a cost of $40,019,000, and listed 67 applications involving $562,913,000 as being processed by the Petroleum Administration for Defense.

Reporting on the status of the industry's expansion program, Carroll D. Fentress, acting finance counsel of PAD, said last week that 286 projects with an estimated cost of $465,269,000 had been disapproved, and that 88 other projects with a cost of $504,039,000 had been withdrawn after submission.

Suit Opposed

States have no basis for tidelands action, court told

WASHINGTON. — The Department of Justice and officials of Florida, Louisiana, California, and Texas told the Supreme Court last week the states of Alabama and Rhode Island have no basis on which to challenge the constitutionality of the "tidelands" act.

The tidelands act was passed by Congress last year acknowledging the title of the coastal states to the offshore resources within their historic boundaries.

The controversy was aired before the court in argument on which the court will determine whether Alabama and Rhode Island shall be permitted to file suit designed to nullify the tidelands quitclaim and "recapture" the funds collected from offshore oil operations.

The funds have been held in escrow by the federal Government following the Supreme Court decisions in the California, Texas, and Louisiana cases that the federal Government had "paramount rights" to the submerged oil and other resources beyond the low-water mark of the states.

Prior to the hearing, the Department of Justice filed a brief opposing the claim of Rhode Island to the right to institute suit. It was similar to the brief previously filed against Alabama, taking the position that the state has no standing to sue, has failed to state a claim on which relief could be granted, and cannot sue the United States without its consent.

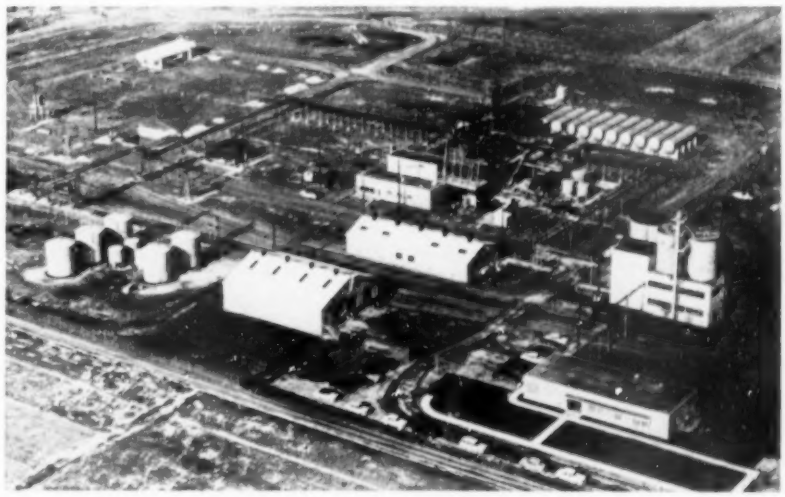
The department rejected the states' claim that the federal Government has paramount rights, declaring it is not supported by the facts.

Research Tax Change Okayed

WASHINGTON. — Oil companies will be given the same option for the tax treatment of research and experimental costs as is now provided for intangible drilling expenses under a proposed amendment to the revenue law approved last week by the House ways and means committee.

The committee agreed to include in the revised tax law now being drafted a provision permitting a business to either write off research and experimental costs in the year in which incurred, or treat them as deferred expenses to be written off over a period of 5 years or more.

While the Internal Revenue Service now permits taxpayers to expense, rather than capitalize, certain research expenditures, there is no specific statutory authority for this treatment. The new provision, it was said, will be particularly beneficial to small business.



New Louisville Petrochemical Plant in Operation

Stauffer Chemical Co.'s new $3,500,000 chemical plant is in operation. The plant, located on a 90-acre tract with Ohio River frontage a mile outside Louisville, Ky., produces perchlorethylene, carbon tetrachloride and hydrogen chloride in tank car quantities. Basis raw material will be hydrocarbons. One feature of the process is a provision for plant operation without the release of noxious gases into the atmosphere. The firm owns an adjoining 90 acres for expansion of the plant, expected within 2 years.

WATCHING WASHINGTON

Bertram F. Linz

Competition Protection

Atty. Gen. Herbert Brownell, Jr., has spelled out the areas of antitrust law violation to which the Justice Department will devote major attention, disclosing for the first time that a close watch will be kept upon industrial research and technological development to prevent its use to suppress competition.

These will be the "hard core" violations to which Brownell has repeatedly referred since he took office last year.

The majority of the 29 cases instituted by the Government during the past year attacked such "traditional" violations as price fixing, allocation of customers or territories and boycotts, but several, the attorney general revealed, have been brought with the aim of removing barriers and monopolistic practices stifling competition along the road from the laboratory to the market place.

"Progress, we all agree, depends in large part on the force of competition," Brownell explained. "Our creed is that new or improved production uses live or die on the basis of their ability to gain market acceptance. Ever watchful we must be, therefore, to insure that new industries, stemming from improved technology, techniques or discoveries, are free to develop. Competition in the research laboratories is as important as competition in the market place."

Brownell has made it clear also that while the department has no desire to harass business through criminal indictments, that approach will be followed in all cases involving violations of law, such as price fixing.

Policy Change Studied

A new policy with respect to its findings of fact, on which the courts are asked to enforce its orders, is reportedly under study in the Federal Trade Commission.

Under the law the facts in a case, if properly supported by the commission, are binding upon the courts. But many respondents, and on occasion the courts themselves, have complained that the commission's findings were imprecise and slipshod. According to one critic, they have frequently been an "obvious attempt to frame findings with a view to the legal result desired, rather than as a mirror of events and circumstances."

These charges have disturbed the commission, anxious to remedy the deficiencies of past administrations. They feel findings of fact, should include a specific statement of the salient facts, as well as conclusions.

Several of the commission's cases, including some involving oil, have developed controversies over its methods of developing facts and findings. In the suit against Standard Oil Co. (Calif.) in 1949, deficiencies in the commission's presentation was a major issue.

President's Economic View

President Eisenhower's experts are confident the current slackening of business is temporary and the economic tide will be reversed in the near future.

The President attributed the turndown late last year mainly to the accumulation of inventories occurring when production outran sales, which was exactly what happened in the oil industry. He admitted, however, that the general trend may have been somewhat accentuated by the administration's tight money policies, designed to halt inflation and not susceptible to quick reversal.

In a program submitted to Congress for "prosperity based on peace," the President called for increased unemployment benefits, higher minimum wages, expanded social security coverage, tax relief for both businesses and individuals, and increased federal credit aid for housing and public works planning.

The basic principle of this program, he explained, "is to pursue measures that will foster the expansion of private activity, by stimulating consumers to spend more money and businessmen to create more jobs, so that the economy may resume its growth with new strength."

But if the downturn in industrial and business activity should threaten to develop into a depression, Eisenhower assured, the Government will not hesitate to take steps to prevent a major economic decline.

Land Bureau to be Revamped

WASHINGTON. — Reorganization of the Bureau of Land Management, recommended by a survey team of industrialists, has been approved by Interior Secretary Douglas McKay.

A major feature of the revamping of the bureau will be decentralization of operations, now concentrated to an undue degree, the survey reported, in the Washington and regional offices.

The survey team found serious neglect in the disposal functions of the bureau.

The report estimated that the bureau has a backlog of 15,000 to 20,000 unclosed adjudication cases, mostly dealing with land disposals and in oil and gas leasing on acquired lands. It recommended the appointment of a docket control officer to speed processing of cases.

Appointment was recommended of 3 to 5 field commissioners to hear and determine issues of fact or law when requested by an applicant or assigned by the director, to serve also initially as adjudicators to assist in cleaning up the backlog of pending cases.

Defense Line Group to Meet

WASHINGTON.—Feasibility of private construction of a dual-purpose defense pipe line from the Texas Gulf Coast area to the East Coast may be determined at a meeting February 11 and 12.

Seven natural-gas company executives will thrash the matter out in the 2-day meeting. They were appointed last month by Deputy Petroleum Administrator Joseph A. LaFortune to study government proposals for industry construction of a big-inch gas line for peacetime which could be converted to crude oil in event of an emergency.

PAD officials are not overly optimistic over the chances of the gas industry's acceptance of the plan. *(The Oil and Gas Journal, February 1, pages 49 and 50.)*

Montana Leases on Sale

WASHINGTON.—Oil and gas leases on 400 acres of land within the known geologic structure of the Kevin-Sunburst field, near Oilmont, Natrona County, Montana, have been put up for sale by the Bureau of Land Management on bids to be opened February 10.

The land is offered in three tracts of 200, 120 and 80 acres. Leases will be awarded to the qualified bidders of the highest cash bonuses, on the usual royalty and rental terms.

WEST COAST

First Hyperformer Set

Regeneration during catalyst lift to feature 1,100-bbl. unit to be built by Calstate Refining Co. at Signal Hill

D. H. Stormont

LOS ANGELES. — First commercial application of Union Oil Co.'s "Hyperforming" process will be a small unit at the Signal Hill refinery of Calstate Refining Co.

According to Ellis G. Slack, general manager, Calstate has been licensed to use the new catalytic desulfurizing and reforming process. Construction of a 1,100-bbl. unit is expected to get under way later this month. Completion is scheduled for about midyear, with the company doing its own construction.

The company's Signal Hill plant does not contain any topping facilities. Process stocks for its 2,500-bbl. thermal cracking unit are obtained from the nearby plant of Century Refining Co.

The new unit will operate on a blend of straight-run and thermally-cracked naphthas containing 0.6 per cent sulfur. Using a moving bed of cobalt molybdate catalyst the Hyperformer will effect simultaneous desulfurization and octane improvement.

Hyperflow employed . . . A unique feature will be regeneration of the catalyst as it is lifted to the top of the reactor. This will be effected through use of Union's "Hyperflow" process, a method for lifting the catalyst at very low velocities and with minimum attrition loss. There will be no vessel solely for catalyst regeneration.

This will be the first commercial application of the Hyperflow lift method in a catalytic processing operation.

Regeneration will be carried out in the lift line by employing a recycle of flue gas with an air injection to keep the inlet oxygen content below 2 per cent. Combination of a moving bed and controlled oxygen content in the flue gas will limit the peak temperature and provide precise control for the removal of coke from the catalyst. Catalyst will enter the regenerator-lift line through a simple lock system located at the base of the reactor.

Union's Hyperforming process is the latest reforming tool available to the petroleum industry. In a single step the process is capable of handling mixtures of low-octane cracked and straight-run gasoline to produce essentially a sulfur-free, high-octane stable motor gasoline. Coke laydown is very small and occurs because the catalyst is capable of promoting beneficial hydro-cracking reactions which reduce product boiling range and thus increase the warm-up qualities of the gasoline.

(A detailed article describing the Hyperforming process appeared in The Oil and Gas Journal, March 23, 1953, page 286.)

Derrick Action Deferred

LONG BEACH. — Proposed ordinances to force removal of old wooden oil derricks and other field hazards have been deferred because of the opposition of oil industry spokesmen.

City Manager Sam Vickers and Edward M. O'Connor, building superintendent, backed the proposed ordinances that would outlaw wooden derricks as unsafe and oil sumps as a public hazard. The city council ordinance committee deferred action on the proposals pending conferences between city officials and industry representatives.

Industry spokesmen protested that the ordinances would put owners of many old wells out of business because production is not enough to pay the cost of new derricks.

No Royalty Change Due

SACRAMENTO. — Gov. Goodwin Knight has denied any plan to include changes in the leasing system of California-owned oil lands on the present legislative agenda.

The governor said he had heard nothing of a rumored move for a special session to cut state royalty provided in the present system. The law restricts the present session of the legislature to the state budget except for matters otherwise authorized by the governor.

SOUTHEAST

Two Fields Linked

Evidence indicates Maxie, Pistol Ridge are one field

HATTIESBURG, Miss.—Current developments in southern Mississippi's companion Pistol Ridge and Maxie fields are providing evidence that the two comprise a single, multiple-sand condensate field, the largest in the state in area.

Oil production, also recently proved in one well, offers additional potentialities for development.

New operations getting under way or in prospect for the immediate future are making this one of the most active spots in the state. Currently, six rigs are drilling within or immediately adjacent to the present productive limits.

The area's only oil well was recently completed and extended productive limits more than a mile to the northwest. Now testing is an indicated gas-condensate well 1½ miles further west of the oiler.

Extension testing . . . Successful completion of this extension well (C on map) will stretch the productive area to a length of more than 10 miles from east to west. From north to south, the

area is now more than 2 miles wide.

The new well, I. P. LaRue and American Liberty Oil Co. 1 Southern Minerals, is testing 46 ft. of gas-showing sand encountered at 8,510-56 ft. in the lower Tuscaloosa-Massive sand (basal Upper Cretaceous). This is the lowest productive horizon so far established in the area. It will be the second well for the area at that level.

Production in the one oil well, same operators' 1 Hatten, 1½ miles to the east, is from the shallower Upper Cretaceous-Eutaw sand, perforated at 7,416-21 ft.

Both of these wells are in northeastern Pearl River County, just across

the line from southern Forrest County, in which the main part of the field is located.

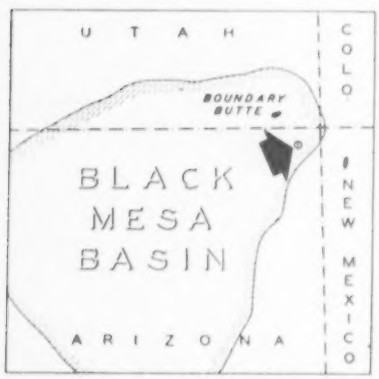
First production here was in the Pistol Ridge sector, opened in January 1951 with a gas-condensate well completed by LaRue and associates in upper Tuscaloosa sand at 7,722-26 ft. Before late 1953, only two additional wells had been completed.

Production in the Maxie sector was opened by Ohio Oil Co. in June 1952 with a Eutaw well, located approximately 5 miles east and a little north of the Pistol Ridge wells. Following the completion of another Eutaw well in December of that year, Ohio stepped out 1½ miles to the southwest, in the direction of Pistol Ridge, with a prolific lower Tuscaloosa well, completed last summer.

Two-well link . . . Linking of the two areas has been virtually established by two wells located approximately midway between the sectors. The first, Southern Natural Gas Co. 1 Creosote (A on map), 2 miles west of Ohio's Maxie southwest step-out and completed shortly afterward, found small gas-condensate production in the same pay. The other, Southern Natural Gas Co. 1 Goodyear (B on map), 1½ miles to the west and 1¾ miles northeast of the Pistol Ridge wells, was completed early in January 1954, as the discovery well of the Massive sand, which the west-extension well of the Pistol Ridge sector now is testing. Southern Natural's new well also is a potential producer in other productive horizons of the area.

To date 19 wells have been completed in the combined areas. These include three in Wilcox sands (all in the Pistol Ridge sector), five in Eutaw sands, one in upper Tuscaloosa sand (in Pistol Ridge sector), nine in lower Tuscaloosa sands above the Massive, and one in the Massive. All, except the one Eutaw oil well northwest of Pistol Ridge, have been shut in since completion pending provision of market outlet.

SOUTHWEST



Wildcat Testing

Shell recovers oil, gas-cut mud from Black Mesa well

FORT DEFIANCE, Ariz.—Shell Oil Co. has recovered oil and gas-cut mud on two drill-stem tests of the Hermosa (Pennsylvanian) formation at a wildcat in the Black Mesa basin of northeastern Arizona.

Previous shows have been reported in Black Mesa wildcats, but the Arizona portion of the 12,000-sq. mile basin has remained unproductive. The basin's only oil production is in Boundary Butte field in southeastern Utah.

Shell's wildcat, the 1 Navajo, is in Apache County southeast of Boundary Butte field. The first test was taken at 4,619-70 ft. Recovery was 100 ft. of slightly gas and oil-cut mud. Recovery of the second test, from 4,670-4,772 ft. gas 300 ft. of gas and oil-cut mud, 450 ft. of gas and mud-cut water.

Pecos Valley Flood Proposed

AUSTIN, Tex.—Hadlock & MacFulton applied to the Texas Railroad Commission last week for a water-flood program for the Yates sand in Pecos Valley high-gravity field, in Pecos County which would recover an estimated additional 560,000 to 720,000 bbl. of oil.

G. L. Buckles, testifying for the applicant, said the flood project would cover 160 acres of a 320-acre tract, comprising the operator's Magnolia-Byrne State "A," Magnolia-Byrne, Magnolia-Byrne State, and Iowa Realty Trust leases. The leases now have 16 producing wells with an average output of 3.65 bbl. per day each from the Yates sand.

The proposal calls for a closed-type injection system, employing a 20-acre, 5-spot pattern, with six wells to be converted to injection service for an input of about 200 bbl. daily under a pressure of about 500 psi. Buckles estimated original oil in place at roughly 1,500,000 bbl., and said the reservoir is about 80 per cent depleted under primary production with recovery of 250,623 bbl. at the first of the year.

Gas Limit Urged

Put Texas needs ahead of exports, legislator asks

AUSTIN.—The latest in a series of outcrys in Texas protesting export of the state's natural gas was raised here last week by Rep. Sam E. Wohlford, of Stratford.

Wohlford, representing six northern Panhandle counties, proposed that a law be passed forbidding export of gas until the state's internal needs are satisfied.

This is necessary, he said, because a portion of his constituents in the northern Panhandle area are having difficulty buying gas even though they live near Hugoton field, the largest gas field in the nation.

In Sunray, Tex., Moore county, Wohlford said, citizens had to purchase their own gas lease because they could not buy from nearby pipe lines. Farmers sometimes cannot buy gas to operate irrigation wells from pipe lines which cross their property, he said.

Wohlford also recommending passage of a minimum price law for natural gas. The state should require that state taxes be paid on a higher basis than at present, he said even if it does not want to help the producer and royalty owner.

The current tax on gas production in Texas is 5.72 per cent of market value. It brings in about $25,000,000 a year to the Texas treasury. Tax payments are based on well-head prices currently averaging about 7 cents per M.c.f.

MID-CONTINENT

Westfall Acquires Mercury

TULSA, Okla.—Chester H. Westfall has resigned as president and general manager of Mercury Drilling Co.

Westfall has become sole owner of all drilling tools, equipment, and drilling operations formerly operated as Mercury. The firm will now operate as Chester H. Westfall Drilling Co.

Westfall said all office personnel employed in drilling operations and all drilling personnel in the field will be continued exactly as under Mercury Drilling Co.

Westfall Drilling Co., as did Mercury, will operate with four rotary rigs.

CANADA

Major New Field?

Bonuses paid for Pembina leases in Alberta's latest sale indicate field regarded optimistically as big reserve

EDMONTON, Alta.—The new Cardium sand Pembina field, 65 miles southwest of here, was the magnet that drew a record $31,675,042 into the treasury as Alberta held its first sale of oil and gas leases in 1954.

The total was 2½ times the previous high for Alberta's May 1952 sale and gives the new field a prominence that has not, so far, been indicated by the field's activity.

Top price in this most recent sale was $13,000,125 paid by Texaco Exploration Co., a wholly owned Texas Co. subsidiary, for a 92,160-acre reservation in the Cynthia reserve, 6 miles west and a little north of Pembina producers.

Imperial Oil, Ltd., paid $11,087,533 for a reservation of the same size immediately north of the Texaco purchase. Two smaller reservations made up the bulk of the remainder. Indian Refining Co. paid $1,100,125 for 87,680 acres and Crown Trust Co. paid $1,813,500 for a 79,938-acre block.

While these Pembina prices do not constitute block sales records for Alberta, they indicate clearly that Pembina field is regarded as a new major Canadian field. This is apparent in spite of the fact that there are only seven producers in the field to date and about a dozen wells being drilled.

Why the excitement? . . . The reasons for this early optimism about Pembina are clouded by the reluctance of operators involved to talk about the field. However, several factors are apparently influencing the outlook for this area. Among them:

. . . First Cardium sand discovery of any commercial importance in Alberta is in Pembina. Oil has been found in four formations—Cardium, Belly River, Viking and Blairmere. The Cardium offers a blanket sand occurrence rather than the more confined reef-producing area of Leduc and Redwater.

. . . Widespread producers at Pembina already measure a field 10 miles north and south and 5 miles east and west. H. E. Somerville, Alberta's deputy minister of mines and minerals, points out indications are that the whole area may be oil-bearing and the field is far from delineated.

. . . A fine grade of 37°-gravity crude is found in the field, comparable to the best oil in Leduc and Redwater.

. . . The field's location is only about 35 miles from Trans Mountain Pipe Line Co.'s line, which serves to increase its value as a producing area.

. . . Good gas pressure exists in the field. At least one well brought itself in.

How it started . . . Pembina's discovery well was brought in last June by Socony-Vacuum Oil Co., Inc., acting as operator with a 50 per cent stake in the combined holdings of Seaboard Oil Co. of Delaware, Honolulu Oil Corp., Merrill Petroleums, Ltd., and Cancoll Oil & Gas, Ltd.

Socony was seeking Devonian production when it drilled last summer. It failed to find it, but did discover some Cardium sand, which has never before proved commercially productive in Alberta.

Socony received consent of the other members of the group to try for Cardium production and the first Cardium well in Pembina flowed last September.

Cost Figure Rises

Canadian official says gas line will cost $700 million

EDMONTON, Alta.—Building of a pipe line to take Alberta gas to eastern Canada probably will cost closer to $700,000,000 than the $300,000,000 being mentioned at present, according to Dana Porter, Ontario attorney-general.

Porter, accompanied by R. H. Saunders, chief of the Ontario Hydro Commission, and A. R. Crozier, Ontario fuel controller, visited Alberta recently to talk to Premier E. C. Manning and Alberta gas industrial leaders.

The project to date has progressed to the point where Trans Canada Pipe Lines, Ltd., and Western Pipe Lines, Ltd., have agreed to amalgamate to build the line, which is proposed also to serve the Minneapolis area. The amalgamated companies still have to satisfy the Alberta petroleum and natural-gas conservation board that there is a market for the gas and the line can be financed.

In estimating the greater cost of the line, Porter figured the cost of Alberta's gathering and supply system at about $200,000,000 and eastern Canada's distribution systems at about $150,000,000. He said numerous other high costs would be involved.

Toronto area consumers would pay between $1.10 and $1.30 per 1,000 cu. ft. for gas through the proposed pipe line, he estimated. This is about three times the cost of gas in Alberta.

Porter does not think the line from Alberta would stop Tennessee Gas Transmission Co. from supplying Consumers' Gas Co. of Toronto with gas. The U. S. Federal Power Commission has authorized export of gas to Toronto, but a Canadian Government permit is still necessary.

MEETINGS

Exploration Meeting Planned

ST. LOUIS.—An attendance of about 4,000 is expected at the annual joint meeting of the American Association of Petroleum Geologists, the Society of Exploration Geophysicists, and the Society of Economic Paleontologists and Mineralogists, to be held here April 12-16.

Graham B. Moody, Standard Oil Co. of California, San Francisco, is general chairman of the convention, and Noel H. Stearn, vice president of W. C. McBride, Inc., St. Louis, is general vice chairman. Earl Dyk, chief geophysicist, Stanolind Oil & Gas Co., Tulsa, is S.E.G. vice chairman, and Norman H. Hinchey, geology department, Washington University, St. Louis, is S.E.-P.M. chairman.

Jet-Fuel Progress Report Set

KANSAS CITY, Mo.—Latest progress in jet-engine fuels will be reported in a symposium on "Fuels for Gas Turbines and Turbojet Engines," by the division of petroleum chemistry at the 125th national meeting of the American Chemical Society.

Dr. J. Bennett Hill, of Sun Oil Co., Philadelphia, Pa., will preside over the symposium during the meeting here, March 24 through April 1.

Meet to Discuss Distillation

PHILADELPHIA, Pa.—Different facets of distillation from the industrial point of view will be discussed at the second annual 1-day meeting here sponsored jointly by the Philadelphia-Wilmington section of the American Institute of Chemical Engineers and the University of Pennsylvania, April 27.

AERIAL VIEW OF RUEHLERMOOR field, which with Ruehlertwist is the largest in the Emsland district, shows the type of terrain in this part of West Germany. The white squares lateral to the highway shown here are all well sites.

Germany Sets Record

West Germany ranks 18th among world's crude producers; domestic consumption and refinery output are equalizing

ANOTHER successful year marked by a new production record and further expansion of domestic refining has been reported by the oil industry in West Germany.

Preliminary figures for 1953 show output amounted to 2,187,934 metric tons, or about 42,500 bbl. daily, as compared to 1,755,430 tons, or 34,000 bbl. daily in 1952.

West German crude production has been quadrupled since 1946, and the republic now ranks eighteenth among the world's producing countries.

First among the West German producing provinces was the Hanover-Celle area with an output in 1953 of 922,610 tons. A substantial part of the increase in this area came from the newly discovered fields of Hohne, Eddess-Nord, and Lehrte. The Emsland area, in which the main field is Ruehlertwist-Ruehlermoor, ranked second with 873,952 tons.

A sharp increase in production occurred in the relatively new producing district between the Weser and Ems rivers (South Oldenburg) where a number of field discoveries were made in 1953. From 43,468 tons in 1952, Weser-Ems increased to 167,434 tons in 1953. The area north of the Elbe River yielded 187,799 tons in 1953, and the fields near Darmstadt and Bruchsal contributed 36,139 tons against only 6,473 tons the previous year.

"Extraordinary" success . . . Prof. Alfred Bentz, president of the Amt fuer Bodenforschung (German Geological Office), was quoted recently in the West German report, Erdoel Informationsdienst, as saying the search for new oil reservoirs in Germany had been "extraordinarily successful" in 1953. Between the producing areas of Emsland and Hanover, there had been a gap of about 70 miles characterized by especially complicated stratigraphic conditions, but in 1953, a total of eight new fields were discovered in this region, with the result that the Hanover area has been almost completely linked to the fields in Emsland.

He said other remarkable progress had been made in both the large exploratory provinces of South Germany. Stockstadt in the Rhine Valley graben was extended, and new fields discovered at Untergrombach and Rot.

Recent reports show the more than 100 rigs running in West Germany are now drilling at an annual rate of more than 1,800,000 ft. During November, total footage of wells in West Germany amounted to 151,411 ft., including 34,518 ft. in exploratory wells, 39,194 in extension wells, and 77,699 in field wells. Thirty-four wells were listed as have been completed as producers during the month.

Refining . . . On the refining side of the industry, the program of the German industry association, Arbeitsgemeinschaft Erdoelgewinnung und Verarbeitung, calls for the production of about 9,000,000 tons, or 180,000 bbl. daily, in finished products in 1954. Dr. Erich Boeder, chairman of the board of A.E.V., said recently that since the home consumption of West Germany in 1954 is estimated at about 8,000,000 tons, a temporary excess of capacity with all its economic consequences will have to be put up with. This condition, he pointed out, is prevailing in quite a number of other European countries to a much more intensified degree. The excess production will be largely in motor fuel, and Dr. Boeder said everything possible should be done to increase exports and deliveries to the European armed forces.

The additional refining plants scheduled to come on stream during 1954 will generally fulfill the program originally established for West Germany by the Organization for European Economic Cooperation. It is now felt that the chief industry aim is no longer one of achieving higher production or increasing existing capacities as it was during the first postwar years. Demand has set a limit on production of products, and competition in the sales market has intensified. The need now is to institute measures that will provide a production corresponding to actual requirements.

Iraq Offers Crude

Bids sought on royalty oil to be produced in 1955

THE Government of Iraq is seeking bids on its 1955 royalty oil.

In an advertisement prepared for publication this week (see page 210) the country's permanent delegation in New York said it will receive bids until May 31 on 3,810,000 tons (about 28,500,000 bbl.) of crude from 1955 production.

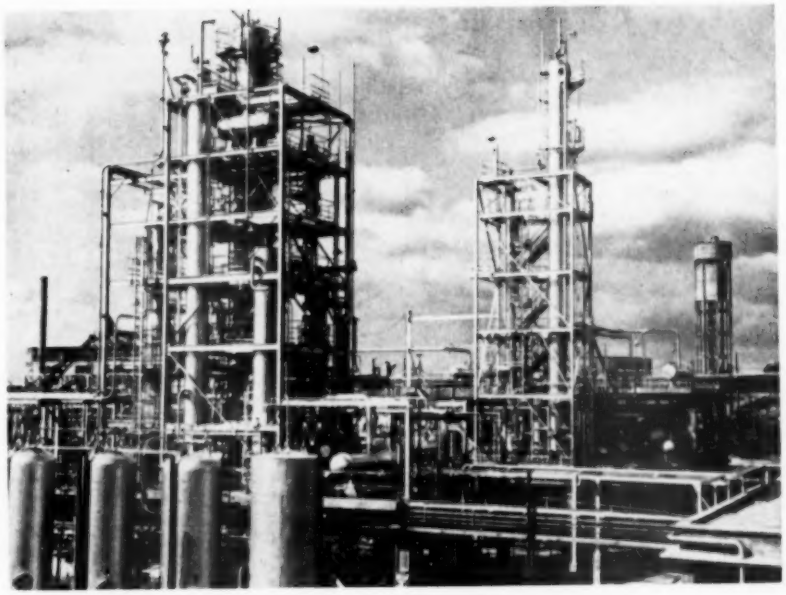
Under the 1951 agreement between Iraq Petroleum Co., Ltd., and the Iraqi Government which provided for 50-50 profit sharing, Iraq receives the standard one-eighth royalty. This oil can be taken in kind and resold or turned back to the companies at the posted price.

The Iraqi Government similarly offered this royalty crude on the world market in 1952 and 1953 but had no buyers, and it was taken up by I.P.C. The posted price at Tripoli and Banias is $2.39 and at Fao on the Persian Gulf, $1.92, all for 36°-gravity oil.

Iraq is interested in obtaining hard currency—preferably dollars—and will give preference "to those who pay in scarce currencies," the announcement said. They could not hope to get any kind of premium over the going price in today's market. I.P.C. pays its income to the Iraqi Government in sterling.

The amount of oil offered indicates a 1955 production by I.P.C. and its affiliates of about 625,000 bbl. daily, with 485,000 bbl. available on the Mediterranean and 140,000 bbl. daily at Fao on the Persian Gulf. The Fao production is that of Basrah Petroleum Co., Ltd., and the remainder is by I.P.C. and Mosul Petroleum Co., Ltd. All are part of the I.P.C. group.

In the two previous years there were rumors of offers to Iraq for the royalty crude. Cities Service was reported interested a couple of years ago, as were Italian and Japanese buyers. Last year the Iraqis asked that the Syrian and other Arab governments buy as much of the royalty oil as they could. None of these deals materialized.



French Petrochemical Industry Growing

These isopropanol and acteone units at the petrochemical plant of Soc. Naphtachimie at Lavera, which went on stream the latter part of last year, illustrate the growing petrochemical industry in France. The company is owned by Soc. Generales des Huiles de Petrole-B. P. (French associate of Anglo-Iranian Oil Co., Ltd.), Cie. Pechiny and Etablissement Kuhlmann. The plant obtains its raw materials from the nearby S. G. P. refinery. (Anglo-Iranian photo).

Austrian Output Disclosed

Oil production in Austria, all in the Soviet occupation zone and under Russian control, last year amounted to around 21,000,000 bbl. (57,500 bbl. daily), according to information from the Austrian Government.

Nearly two-thirds of the production comes from the Matzen district which was discovered in 1949, much of the remainder from Muehlberg, and only minor amounts from the older Zisterdorf fields.

Annual throughput of the Austrain refineries, also under the Russian control, has been stepped up to 12,600,000 bbl. (34,500 bbl. daily). The Soviet Mineral Oil Administration has undertaken to deliver 7,066,500 bbl. of products for sale in Austria this year, including gasoline, 1,050,000 bbl.; gas oil, 1,330,000 bbl.; and fuel oil, 3,850,000 bbl.

Last summer, the Russians abandoned further exploratory work in their zone in Austria, moved out a large number of rigs, and centered their efforts in producing existing fields. This move followed the visit of a special Russian economic mission to the Austrian occupation area, and is thought to reflect a belief that output had been built to a satisfactory level and that the equipment could be better used elsewhere.

Gasoline Additives in Britain

The principal marketing companies in Britain have begun the promotion of special additives as features of their premium-grade gasoline.

The Shell premium motor fuel has been delivered to the pumps containing an additive, I.C.A. (Ignition Control Additive). This gasoline is distributed by Shell-Mex & B.P., Ltd., the joint marketing company for Shell and Anglo-Iranian Oil Co., Ltd.

A new additive, N.S.O. (Naphthenic Solvent Oil) has been included in all deliveries of Esso Extra by Esso Petroleum Co., Ltd. [Standard Oil Co. (N.J.)]. Regent Oil Co., Ltd. (Caltex and Trinidad Leaseholds, Ltd.) has placed on sale a T.T. gasoline with a special V.C. (Voltane Control) additive.

Platformers on Stream

U.O.P. Platforming units, the first of these catalytic reformers to be installed in the Far East, were recently placed in operation at two Japanese refineries associated with the Caltex organization.

The Platformer at Koa Oil Co., Ltd's. Marifu refinery has a design capacity of 1,300 bbl. per stream day. The other unit, with the same capacity, is at the Kudamatsu refinery of Nippon Petroleum Refining Co., Ltd. Construction of the units was the culminating step in extensive modernization programs carried out at the refineries.

The Platformers were the 34th and 35th to go on stream since October 29, 1949. Thirty of those on stream are in the United States, and there is one each in Australia, England, and Canada. Thirty-six others are in various design or construction stages.

Tanker Record Set

More than 3 million tons added to 1953 world fleet

THE world total of oil tanker tonnage increased during the second half of 1953 by about 2,000,000 deadweight tons, while the aggregate rise for the entire year of 3,650,000 tons d.w. was the largest annual gain on record.

Figures compiled by the London firm of Davis & Newman, Ltd., show that the world fleet, exclusive of vessels owned by the U. S. Government and those of the U. S. Navy, for which no accurate figures are available, amounted to approximately 36,000,000 tons d.w. at the end of 1953.

Despite the scrapping or sale overseas of 27 vessels totaling some 292,000 tons, the British tanker fleet rose by 160,000 tons to 7,656,636 tons d.w. The United States commercial fleet increased by about 113,000 tons to 7,264,756 tons, and the Norwegian fleet by around 420,000 tons to 5,483,041 tons.

Tonnage contracted or building but not yet launched in Europe, the United States, and Japan was estimated at about 11,500,000 tons at the end of the year. This was a decrease of some 1,800,000 tons since the middle of 1953. The figures show that the tanker of 16,000 to 18,000 tons d.w. has become the "standard" type, although the trend is toward increasing size. Tankers of 32,000 tons d.w. are now fairly common, while a few of the latest ships are of 45,000 tons.

Lloyd's report . . . The 1954 edition of Lloyd's Register of Shipping pointed out in its appendix report that world tanker tonnage, in gross tons, has doubled since the pre-World War II period of 1939. The Lloyd's report also pointed out the increasing ratio of tanker tonnage to total shipping tonnage the world over.

Of all the world merchant ships of 10,000-15,000 gross tons under 10 years of age, 78 per cent were tankers. Of the vessels between 15,000 and 20,000 tons and less than 5 years of age, 90 per cent were oil tankers.

The fast disappearance of the coal-burning ship from the seas also was pointed out in the report. Last year, only 13 per cent of the world's ocean shipping of all kinds depended on coal, while the remainder burned oil. In 1939, some 45 per cent of the world fleet was coal-bunkered, and in 1914, about 97 per cent used coal fuel.

Kuwait Port Expanded

A further expansion of oil-loading facilities at the port of Mina-al-Ahmadi has been carried out by Kuwait Oil Co., Ltd.

As a result of the completion in January of three new submarine pipe lines, four tankers can now be loaded through offshore lines while moored to buoys. In addition, eight tankers can be loaded simultaneously at the main jetty.

To carry oil from the tank farm to the tanker loading area, two new gravity-flow pipe lines have been laid over the 5-mile slope to Mina-al-Ahmadi. One of these lines is 34 in. in diameter, and the other partly 34 and partly 30 in.

Mina-al-Ahmadi ranks as one of the world's largest oil ports. On account of periods of bad weather, turnaround time, etc., the capacity for loading must be considerably in excess of daily average production. Last year, Kuwait's production averaged about 862,000 bbl. daily with the December output a record 951,000 bbl. daily.

Egypt Signs Oil Pact

Conorada gets concession over 72,000 square miles

THE Conorada Petroleum Corp. has obtained a concession over nearly 72,000 square miles of the western desert of Egypt.

The agreement was signed February 3 in Cairo by A. A. Curtice, Conorada president, and Dr. Helmi Baghat Badawi, Egyptian minister of commerce.

The area involved is bounded by the thirtieth meridian just west of Alexandria, the Lybian border, the twenty-eighth parallel, and the Mediterranean. It is wildcat exploration territory. Egypt's present production is in several fields of Anglo-Egyptian Oilfields, Ltd. (Royal Dutch-Shell) and Socony-Vacuum Oil Co., Inc., on both sides of the Gulf of Suez.

Conorada agreed to spend at least $8,000,000 on exploration in the first 6 years. The concession is for 30 years, renewable for a like period.

If commercial oil is found, the company has the right to leases at an annual rental of $25,000 for each block of approximately 156 square miles. Egypt would receive royalties of 15 per cent for the first 10 years then rising to 25 per cent.

Russia Ships to Argentina

The first shipment of petroleum products under the recently concluded Russian-Argentine trade agreement is scheduled to arrive in Buenos Aires in February.

Trade sources in the Argentine capital said the cargo would consist of 7,000 tons of Soviet aviation gasoline and 4,500 tons of crude oil and that the price would be equivalent to $80 and $30.12 per ton, respectively, at the port of Buenos Aires. This would equal about 62,500 bbl. of aviation gasoline at 21.4 cents a gallon, and

Station Gives Sumatra Crude an 80-Mile Push

From Standard-Vacuum's Akar pump station in South Sumatra, crude is moved 80 miles to the company's Sungei Gerong refinery, one of the largest in the Far East. Talang Akar field was discovered in 1922. Indonesia's output now amounts to about 210,000 bbl. daily and is produced by three companies, Standard-Vacuum, Shell and Caltex. (Standard-Vacuum photo).

about 33,000 bbl. of crude at $2.20 a barrel.

The agreement signed last August 5 by Russia and Argentine officials is renewable from year to year and provides for mutual trade which could amount to $200,000,000 annually. All payments are to be made in U. S. dollars unless other currency is agreed on.

Reports on the agreement at the time did not mention Soviet aviation gasoline but listed 500,000 metric tons of crude oil, or 365,000 bbl., of crude oil among the commodities which Russia undertook to supply.

World Congress Dates Set

The general organizing committee for the Fourth World Petroleum Congress has scheduled the meeting in Rome, Italy, June 6-15, 1955.

Chairman of the general organizing committee is Prof. M. Boldrini, Rome. The committee anticipates that the atmosphere of the Italian capital, with its monuments and millenarian institutions, together with its large and modern hotel system, and Rome's natural and artistic background will afford an unusual setting for the world-wide scientific discussions. There will be excursions to Italy's industrial and oil-refining plants.

Secretary of the general organization committee is Dr. A. A. Muston, Via Tevere 20, Rome; secretary of the permanent council is D. A. Hough, Institute of Petroleum, 26 Portland Place, London W.1. Dr. E. V. Murphree, president of Standard Oil Development Co., is chairman of the permanent council of the World Petroleum Congress.

The first World Petroleum Congress was held in London in 1933, the second in Paris in 1937, and the third in The Hague in 1951.

As for the previous congresses, The Oil and Gas Journal will publish detailed programs and agenda as they become available from the Italian organizing committee and the permanent council, and publish a special editorial section subsequent to the Congress.

British Gas Search Begun

An exploration program in search of natural gas in Britain has been launched on behalf of the British Gas Council by D'Arcy Exploration Co., Ltd., prospecting subsidiary of Anglo-Iranian Oil Co., Ltd.

In Sussex, a series of shallow core holes is being drilled from near Wych Cross to Ticehurst, and a location will be chosen for a deep test. At Cousland, near Dalkeith, Scotland, a well is to be drilled to assess more accurately a gas reservoir located before the war.

International Briefs

A petroleum engineering school is scheduled to be opened this year at the University of Santander at Bucaramanga in Colombia. During the first year the school will be supported with a grant of Ps480,000 ($192,000) from Empresa Colombiana de Petroleos, the government oil organization, and students will be given field training in E.C.P.'s producing areas in De Mares. A new building is to be built for the school.

British refineries of Anglo-Iranian Oil Co., Ltd., last year processed 67,340,000 bbl. of crude, or an average of about 184,500 bbl. daily, according to a company announcement. The total represented an increase of 18,500,000 bbl., or 26.4 per cent, over combined throughput of the plants the previous year. Most of the increase resulted from the commissioning of the company's new 80,000-bbl. daily refinery on the Isle of Grain in Kent. During 1953, shipping terminals handling oil cargoes for the company's three refineries in South Wales (Llandarcy), Scotland (Grangemouth), and Kent (Isle of Grain) loaded and unloaded 2,557 tankers.

Glenn McCarthy, Houston oil man, said drilling crews will start work on the first well in the Los Monos concession of Bolivia within 2 weeks. He said that due to the rainy season, crews are a little behind schedule.

Crude-oil shipments are beginning to arrive at Geelong, near Melbourne, Australia, in preparation for the opening of the new 25,000-bbl. daily Shell refinery. The first tanker recently discharged 86,000 bbl. of Borneo crude, and a second a few days later delivered an equal amount of the same crude. The first stage of construction at the refinery is nearly complete, and a formal opening is set for March 18. Charge for the plant, the first of several major refining projects in Australia to be completed, will be drawn from the Middle East as well as from Borneo, both sterling sources.

Two large-scale aerial magnetometer surveys have recently been carried out in New Guinea on behalf of the companies operating in Australian Papua and in the western Dutch-controlled part of the country. A Canso flying boat operated for Aeromagnetic Surveys, Ltd., recently returned to Canada, after logging 113,000 miles in 7 months. In making the surveys, 33,000 miles was flown over 80,000 miles of territory in both Netherlands, New Guinea and adjacent Papua.

Yugoslav Engineers Tour Oklahoma Installations

A 12-man group of Yugoslavian engineers toured Oklahoma oil fields, installations and equipment manufacturers recently under the sponsorship of the U. S. State Department. Pictured here with their hosts they are, (first row, left to right) Dusan Arandjelovic, chief of geomagnetic team of the Institute for Geological and Geophysical Research, Serbia; Vlastimir Nedeljkovic, manager of oil and gas fields at Velika Greda; Bozidar Kojicic, chief of department, enterprise for Exploitation of Oil and Gas, Zrenjanin; Vjekoslav Peros, drilling engineer Naftaplin, Zagreb; Vladimir Aksin, chief geologist, Enterprise for Exploration and Production of Oil and Gas, Zrenjanin. Second row, (left to right) A. E. Laurencelle, representative of the Industrial Technical Assistance Division of the Foreign Operations Administration; I. W. Alexander, Oklahoma representative, Fred E. Cooper Inc.; H. Thies, FOA interpreter; Stejepan, field manager, Naftaplin, Sagreb; R. Minner, FOA interpreter; Ivo Kelmencic, production chief, Lendava, Solvenia; Ljubisa Paradjanin, chief engineer, Enterprise for Exploration and Production of Oil and Gas; Josip Vuckovic, chief engineer, Naftaplin, Zagreb; Milan Gradisnik, drilling engineer, Lendava oil field; Dusan Radonicic, chief, Department of Deep Drilling, Lendava oil field; Robert Sturtz, Chief Exploitation Engineer, Naftaplin, Zagreb; J. W. Allen, president, Fred E. Cooper, Inc.; L. M. Gasche, vice president, Fred E. Cooper, Inc.

Cycle Complete

Refining to sales and back is story of new president

TWENTY-FIVE years ago, a youthful chemical engineer, took a flyer in oil marketing because he thought he might like it—if he didn't, he had nothing to lose.

Last week that engineer moved back to his original field, refining. This time he goes as president of a new company, and he can trace the new position directly to the fact that his experience in sales helped make him a well-rounded executive.

William J. (Bill) Carthaus last week took over as president of Great Northern Oil Co., formed to build and operate a 20,000-bbl. or larger refinery near St. Paul, Minn.

+ + +

The tall, genial president of Great Northern wound up his 25 years with Deep Rock Oil Corp. in Tulsa last week expressing "sincere regret" at leaving the company he first joined as manager of naphtha and specialty sales in 1929—fresh from a research laboratory.

A native of Newcastle, Pa., Carthaus graduated from the University of Illinois in 1920 with a chemical engineering degree and did graduate work at Massachusetts Institute of Technology.

He was assistant chief chemist at Shell Oil Co.'s Wood River research laboratory in 1929 when he first met B. L. (Barney) Majewski, then Deep Rock's general sales manager. He recalls today that he and Majewski "got into a wrangle right away," but Majewski offered him a job in sales and he took it because, "I like people."

Deep Rock at that time had just entered a new field—production of commercial naphthas — and needed sales personnel with a knowledge of chemical processes and formulae to sell to manufacturers. No one at Deep Rock knew much about naphtha, and neither did Carthaus.

"I became an expert in a hurry," he says today with a chuckle.

Some of the same big manufacturing accounts that Carthaus sold for Deep Rock 25 years ago are still good customers of the company.

+ + +

In 1933, Carthaus was moved up to assistant general sales manager and 5 years later became sales manager. He remained at the helm of Deep Rock's sales department for the next 10 years and until a "new regime" at Deep Rock found additional uses for his talents.

W. H. Garbade became Deep Rock president in 1948 and wanted a fresh look at Deep Rock's operation from top to bottom. He sent Carthaus to Tulsa early in 1948 as head of an "economic survey committee" to study all phases of operation on a "temporary assignment." Carthaus returned to Chicago to recommend a reorganization and expansion program but was sent back to Tulsa as assistant to the president to put the new program into effect. He remained in Tulsa until he left the company last week.

It was at this point that Carthaus began his swing back toward manufacturing and research.

Now he was vice president for manufacturing and research. His responsibility included the expenditure of $5,000,000 at the Cushing refinery for engineering and construction.

"We, like most of the other independents, were about 8 years behind the times", Carthaus says. "We didn't even have a cat cracker."

After that first $5,000,000 program, Carthaus was responsible for another $4,000,000 program to provide new refining and pipe-line facilities. In this same period, he gave Deep Rock "a whole new team" of 38 supervisors, all of them chemical engineers or chemists and all of them graduates of top notch technical schools.

It was this technical sales knowledge, coupled with experience in handling modernization and expansion that made Carthaus a logical choice to head the new company when Great Northern was formed last year.

John Fred Williams has been elected vice president of Ashland Oil & Refining Co. He has been with the company since 1948 and was named personnel director in 1950.

Fred G. Cottle has been named general manager of a new department of Imperial Oil, Ltd., responsible for the supply and transportation of all crude oil and products. The management assistant in the new department is **J. C. Neale. R. B. Spears** succeeds Cottle as manager of supply activities, now a division of the new transportation and supply department.

John J. Corrigan has been named superintendent of pipe lines for Transcontinental Gas Pipe Line Corp., Houston. **C. D. Richardson** will become the new assistant superintendent of pipe lines. Corrigan, who has been a pipe liner for 27 years, was superintendent of transportation for Panhandle Eastern Pipeline Co. before joining Transco in 1950. He succeeds **J. W. Hall,** who is resigning to enter private business. Richardson formerly was division pipe-line superintendent at Atlanta.

Wilfred O. Taff and **Dr. Neil V. Hakala** have been appointed assistant directors in the Esso Laboratories at

W. O. TAFF

N. V. HAKALA

Linden, N. J., by Standard Oil Development Co. Taff, with S.O.D. since 1939, will be responsible for research and development on new fuels processes. Hakala will be responsible for research on automotive fuel quality and combustion problems on automotive engines. He has been with S.O.D. since 1943.

L. P. Foote, superintendent of Ohio Oil Co.'s gas plant at Markham, Tex., since 1949, has been promoted to senior petroleum engineer on the staff of the chief petroleum engineer with headquarters in Findlay, Ohio. Foote joined Ohio Oil in 1935 and was superintendent of the firm's cycling plant at Bakersfield, Calif., from 1944 until being moved to Markham.

PERSONALS

Gentry Lee, vice president and general counsel of Cities Service Oil Co., Bartlesville, Okla., has been appointed chairman of the oil committee of the American Bar Association's mineral law section.

Jack C. Stipe, party chief for Kerr-McGee Oil Industries, Inc., has been transferred from Faith, S. D., to Dalhart, Tex.

Edward A. Koester, consulting geologist, Wichita, Kans., has been elected president of the American Association

E. A. KOESTER

G. B. MOODY

of Petroleum Geologists. Other new officers are: **Graham B. Moody,** chief reserves engineer for Standard Oil Co. of California, San Francisco, vice president; **Elliott H. Powers,** vice president in charge of exploration, Southern Production Co., Inc., Fort Worth, secretary-treasurer; and **Armand J. Eardley,** chairman of the division of earth sciences at the University of Utah, editor. The new officials will take office at the close of the organization's convention in St. Louis April 12-16.

Jack Smith, production superintendent, has been transferred by Deep Rock Oil Corp. from Hutchinson, Kans., to Wichita where the firm's district office has been moved. Others moved to Wichita resulting from relocating the district office include: **Richard D. Michaels,** district engineer; **Charles A. DeMars,** manager of production; and **K. A. Hoeke,** area geologist.

Paul G. Benedum, Republic Oil Refining Co. and **Harlan H. Piggott,** Carnegie Natural Gas Co., both of Pittsburgh, and **C. C. Huffman,** Cato Oil & Grease Co., Oklahoma City, Okla., have been elected to the board of directors of the Pennsylvania Grade Crude Oil Association. Presidents of three area associations of Penn Grade crude-oil producers who have been placed on the board are: **Kenneth M. Kew,** Newark, Ohio, Ohio Oil and Gas Producers Association; **Edward S. Martin,** Washington, Pa., Southwest Pennsylvania Producers Association; and **W. A. Hessin,** Oil City, Pa., middle District Producers Association.

Robert Paschall, district geologist for Hancock Oil Co., has been placed in charge of a new coastal district geological office in Ventura, Calif.

Edward Dzubak, petroleum-engineer trainee for Socony-Vacuum Oil Co., Inc., has been transferred from McAlester, Okla., to Dallas.

Irvin E. Miller has been made superintendent of the laboratory at Standard Oil Co. (Ind.) refinery now being constructed at Mandan, N. D. He has been succeeded as group leader at Standard's Sugar Creek, Mo., laboratory by **B. J. Duffy, Jr.**

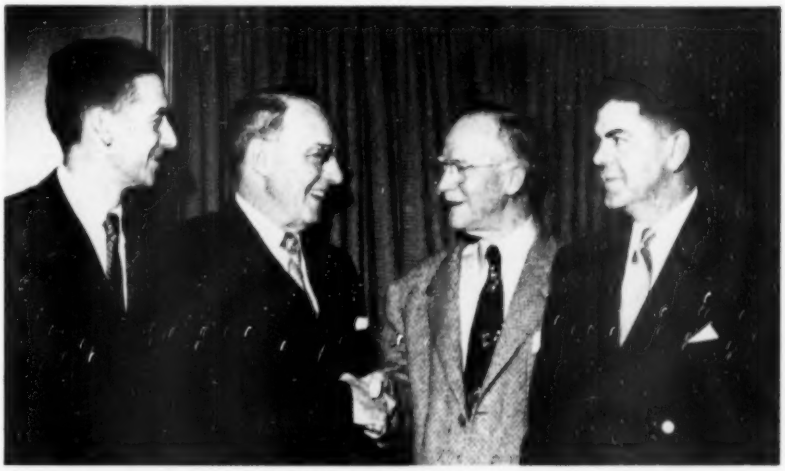
Lewis Dickson, Houston attorney and banker, has been named chairman of the board of a new oil firm, Texas Pioneer Oil Co., headed by **Andrew Urban,** formerly of Houston, but now of Abilene, Tex., who is president and director. Other officers are: **D. N. Claflin,** engineer with Brown & Root, Inc., vice president; and **D. C. Bullard,** Beaumont, vice president and director. Other directors include: **Jesse H. Horn, L. Vernon Miller, Sidney A. Adger, W. R. Haynes, Jewel S. Jones,** and **Julius Levi.** The firm will drill and develop two drilling blocks of more than 400 acres near Ranger, Tex.

Jack L. Tillman, geologist with Shell Oil Co., has been transferred from Oklahoma City to Houston.

Dr. W. C. Howells, formerly manager of Anglo-American Exploration, Ltd., has joined McColl-Frontenac Oil Co., Ltd., as general manager of the firm's new domestic producing department. The new department allows McColl-Frontenac to resume activity on its own behalf in western Canada in addition to continuing its working agreement with Texaco Exploration Co. under which it has conducted producing activities during recent years.

W. W. White, vice president of Esso Export Corp. in charge of international aviation activities, will become a director of petroleum logistics in the Defense Department, succeeding **Brig. Gen. Alfred Johnson** who has been assigned to the office of the Joint Chiefs of Staff.

Ovid Baker, chemical engineer for Magnolia Petroleum Co., has been elected and installed as chairman of the Dallas Chemical Engineer's club. Other new officers include: **Howard A. Koch, Jr.,** chemical engineer in the research division of Atlantic Refining Co., vice chairman; **Harold A. Blum,**



"The General" Visits With Old Friends on Tulsa Trip

Lt. Gen. Ernest Thompson, chairman of the Texas Railroad Commission, chats with some oil-industry acquaintances following his recent address before the Engineers Club of Tulsa. Left to right are W. L. Horner, vice president of Sunray Oil Corp.; J. L. Shakely, president of Oklahoma Mississippi River Products Line, Inc., a Sunray affiliate; General Thompson; and J. E. Byers, president of the Engineers Club and district manager for Black, Sivalls & Bryson, Inc.

PERSONALS

senior physicist for Atlantic Refining, secretary-treasurer; and **Charles J. Holland,** Sun Oil Co., **William R. Symonds,** Proctor & Gamble, **Fred Zapffe,** Lone Star Gas Co., and **Bob Graff,** Bob Graff Engineering Co., executive committee.

Gilbert A. Naert, formerly petroleum engineer for Ohio Oil Co. at Terre Haute, Ind., has been transferred to Bridgeport, Ill., as district petroleum production engineer.

Curtis Morris, transmission-line consultant for the American Gas Association and former vice president of Transcontinental Gas Pipe Line Corp., has been appointed Washington representative of A.G.A. He succeeds **George H. Smith,** who has retired as assistant managing director of A.G.A., an office he had held since joining the association in 1944.

Dr. W. H. Balka, consulting engineer, Dallas, has been named vice president of Lynn Carbon Black Co., San Angelo, Tex. The firm announced in 1952 a new and cheaper process for manufacturing carbon black from natural gas. *(The Oil and Gas Journal, November 24, 1952 p. 72.)* He has assisted in design and modification of the new plant the company plans to build south of Santa Anna, Tex.

C. Ducloz, geologist in Venezuela for Texas Petroleum Co., has been transferred to the Peruvian affiliate of The Texas Co.

LeRoy H. Hines has resigned as vice president in charge of oil development for Northern Pacific Railway Co., effective February 15. He has held the post since April 1952.

William N. Tindell has been promoted by Mayfair Minerals, Inc., from assistant district geologist at Abilene, Tex., to district geologist.

E. G. (Eddie) Durrett has been advanced from drilling superintendent to manager of Delta Gulf Drilling Co.'s West Texas division. He was with Loffland Brothers Co. on the Gulf Coast and in West Texas prior to joining Delta Gulf.

James E. Pew, manager of the natural-gas and natural-gasoline department of Sun Oil Co., Philadelphia, has been elected chairman of the National Council for L.P.-Gas Promotion. He is a past president of the Natural Gasoline Association of America, one of three trade organizations sponsoring the L.P.G. promotional program.

DICK FENWICK

Dick T. Fenwick has been appointed manager of the production and operations department of Southern Production Co., Inc. He replaces **Roy C. Williamson,** who recently became president. Fenwick joined Southern Production in 1941, and was manager of the firm's natural-gasoline and processing departments in Fort Worth prior to his promotion.

H. H. Hall, for many years chief engineer of Standard Oil Co. of California, has been retained as consultant by Burmah Oil Co., Ltd., in connection with plans for pipe lines through the Indus Valley to Karachi to utilize natural gas from the recent discovery at Sui in West Pakistan. From 1947 until 1950 Hall was resident vice president of Trans-Arabian Pipe Line Co. **B. S. Everett,** who was superintending engineer in Burmah Oil Co. (Pipelines), Ltd., in Burma, has been sent to Pakistan to work on the Sui pipe-line project with Hall.

Bishop Holds 3-Day Meeting for Field Staff

A 3-day staff meeting for members of Bishop Oil Co.'s field staff from California, Mid-Continent and Canadian oil fields was held in San Francisco late in January. Dean H. Sheldon, Southern California petroleum consultant (left), is shown emphasizing some of the points he made in his talk on oil-property valuation to Donald I. Lawless, manager of exploration for Canadian Bishop Oil Co., Ltd. (center), and William Wallace Mein, Jr., president of Bishop.

Charles T. Slack, formerly engineering examiner for the Texas Railroad Commission, has joined Pinkston, Miller and Keithly, oil and gas consulting firm with headquarters in Austin, Tex. Slack joined the commission in 1949 and was promoted to senior engineer and examiner early in 1952. He has been replaced by **Charley Stamos,** who has been transferred from Kilgore to Austin.

Dr. Arthur Philip Lien, section leader in the research laboratories of Standard Oil Co. (Ind.) at Whiting, Ind., will receive the $1,000 Precision Scientific Co. award in petroleum chemistry March 27 at the American Chemical Society's 125th annual meeting in Kansas City. Lien has done research on the chemical conversion of certain less useful hydrocarbon components of petroleum into more useful materials, and on the chemical nature of sulfur compounds in petroleum. His studies have resulted in developing practical refining processes for separating complex mixtures of hydrocarbons and for removing sulfur compounds from petroleum.

PERSONALS

Charles H. Pishny and **Burton Atkinson** have formed Pishny & Atkinson, petroleum consulting firm with headquarters in Fort Worth. Pishny formerly was with Berger & Pishny. Atkinson had been a consulting petroleum engineer in Midland, Tex.

Glen R. Horton and **Lawrence G. Davis,** geologists, have joined Lion Oil Co. at the firm's Denver and Casper, Wyo., district offices, respectively. Prior to joining Lion, Horton had been with Sinclair Oil & Gas Co. and Tide Water Associated Oil Co. in Casper, Wyo. Davis formerly was with Sun Oil Co. in Billings, Mont.

E. R. Kanhofer has been named to the newly created post of general manager of manufacturing activities by Universal Oil Products Co. **H. W. Grote** succeeds Kanhofer as assistant manager of the firm's laboratories. **Dr. Julian M. Mavity,** formerly supervising research chemist, has been made coordinator of service laboratories, another new position.

Wallace C. Thompson has been elected president of General Crude Oil Co., replacing Thomas W. Pew, who died last month. Thompson had been vice president and chief geologist.

G. T. NAFF

George T. Naff has been elected president and a director of Texas Eastern Transmission Corp., succeeding R. H. Hargrove, who was killed in an airplane crash in January. Naff has been first vice president of the company since 1948, and from 1941 until 1947 was vice president and general counsel of United Gas Corp. He also is a member of the Gas Industry Advisory Council, and a director of Texas Eastern Production Corp., Wilcox Trend Gathering System, Inc., and other Texas Eastern affiliates.

Maxwell Goldhar has been elected president and a director of Kenwell Oils & Mines, Ltd., Toronto, an independent Canadian firm active in the United States and Canada. **Kenneth Kelman** also was elected to the board and made vice president. Goldhar succeeds **Watkin Samuel** as president, and Kelman replaces **Monroe Abbey** as vice president. Kenwell is participating with other companies in the exploration of the oil sands along the Athabaska River in Alberta.

John Tom Reynolds, with D. D. Feldman Oil & Gas for the last 3 years, has become a consulting petroleum engineer in Dallas. He plans to specialize in property management.

James E. Dyer, vice president and director of marketing of Sinclair Oil Corp., has been elected president of Sinclair Refining Co., replacing **P. C. Spencer,** who continues as head of Sinclair Oil, the parent company. **C. J. Allen,** vice president of Sinclair Refining, has been named executive vice president, succeeding **M. L. Gosney,** who remains as executive vice president of the parent company.

Jackson D. Breaks and **Eugene M. Geddes** have been elected to the board of directors of Middle States Petroleum Corp.

S. B. Irelan, president of Cities Service Oil Co., has been elected to the board of directors of the First National Bank & Trust Co., Tulsa.

Dr. Kenneth G. Mackenzie will retire February 28 as assistant to the vice president in charge of the refining department of The Texas Co. He plans to open petroleum consulting offices in Westport, Conn. Mackenzie had been with the firm since 1911.

DEATHS

W. W. McFarland, 77, died January 30 at Glen Ridge, N. J. He was with Sun Oil Co., Philadelphia, from 1906 until 1912. From then until 1933 he was with Warner-Quinlan Co., serving as president the last 7 years. McFarland was vice president of Cities Service Oil Co. from 1937 until 1952.

Roy E. Anderson, 67, Shreveport independent operator, died recently while en route to Mobile, Ala. He was active in East Texas, southern Arkansas, and northern Louisiana. Before becoming an independent operator, Anderson had been with The Texas Co.

John Dewolf Northrop, 67, died January 31 at Washington, D. C. He joined the U. S. Geological Survey in 1911 and was in charge of mineral classification of land owned by the federal Government.

Robert Anthony Josey, 83, pioneer Texas and Oklahoma oil man, died January 31 in Houston. He began his oil career at Spindletop and is credited with having drilled the second well in that field. He had been in the oil industry for more than 50 years, and at the time of his death was president of R. A. Josey, Inc., Gem Oil Co., and Midwest Production Co. Josey, with the late Charles Page, helped develop Cushing field in Oklahoma and brought in Josey pool in Okmulgee County, Oklahoma. Shortly before moving to Houston he sold his holdings to The Texas Co. for an estimated $10,000,000.

Fred Bowles, 61, died February 1 at Ada, Okla. He had been an oil and gas conservation officer for the Oklahoma State Corporation Commission for 20 years.

Henry Green Reed, 63, president of Petroleum Capital Corp. and Calgon Oil Co. since 1936, died recently at Pasadena, Calif., following a short illness.

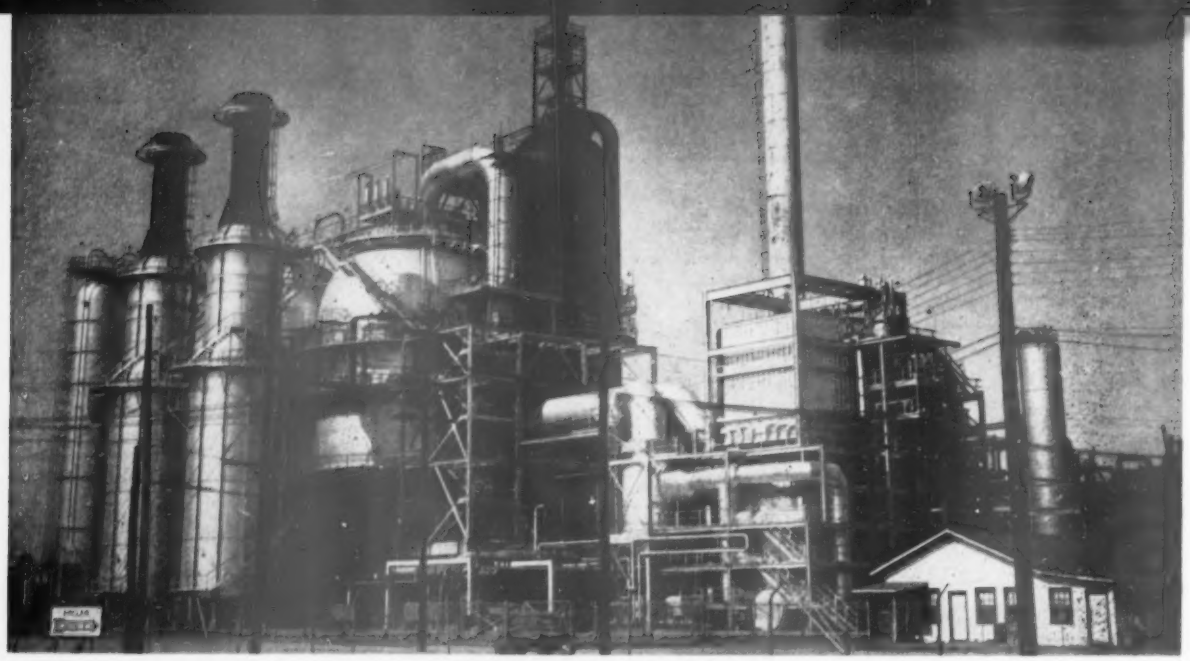
Oscar J. Rohde, 70, Los Angeles, died recently in New York. He was active in development of Montebello and Santa Fe Springs fields of California.

Hugh (Spike) Leonard, 47, executive vice president of Halliburton Oil Well Cementing Co., died January 29 at Chickasha, Okla., following a heart attack.

Richard G. Donnelly, 62, former superintendent in the production department of The Texas Co. at Electra, Tex., died February 3 at Electra following a heart attack.

Charles Nelson, Jr., 74, died February 3 in Oklahoma City. He retired about 12 years ago as secretary-treasurer of Oklahoma Pipeline Co., now Interstate Oil Pipeline Co. He had been with the firm about 30 years.

Herbert Edwin Rankin, 67, retired senior production clerk for Standard Oil Co. of California, died recently in Los Angeles.



The CO boiler is to the right of the main vessels. The tall insulated tower is the reactor, while the short, wide aluminum vessel to the right of the heaters is the regenerator.

Latest design features incorporated in . . .

Sinclair's New 40,000-Bbl. F.C.C. Unit

by F. Lawrence Resen
Gulf Coast District Editor

- **A sectionalized stripping section in the reactor.**
- **A new bed-level control arrangement in the reactor.**
- **A novel support for the regenerator grid.**
- **A CO boiler and regenerator superheater.**
- **A compact reactor-regenerator setup.**
- **Layout provisions to simplify maintenance.**

These are features of a 40,000-bbl. per day fluid catalytic cracking unit, designed by Sinclair Refining Co. engineers, which has been placed on stream at the company's Houston refinery.

Unit operation provides for recycling 10,000 bbl. of stock daily in addition to the 40,000-bbl. charge of fresh feed. The unit, which was constructed by C. F. Braun & Co., was placed in service in late October.

Design calls for production of 15,300 bbl. of light gasoline, 6,300 bbl. of butane-butylenes, 2,250 bbl. of propane-propylenes, 1,750 bbl. of heavy gasoline for reforming stock, 4,400 bbl. of light gas-oil, 6,000 bbl. of heavy gas-oil, and 1,200 bbl. of clarified oil from the daily 40,000 bbl. of virgin gas-oil charge stock.

Reactor System

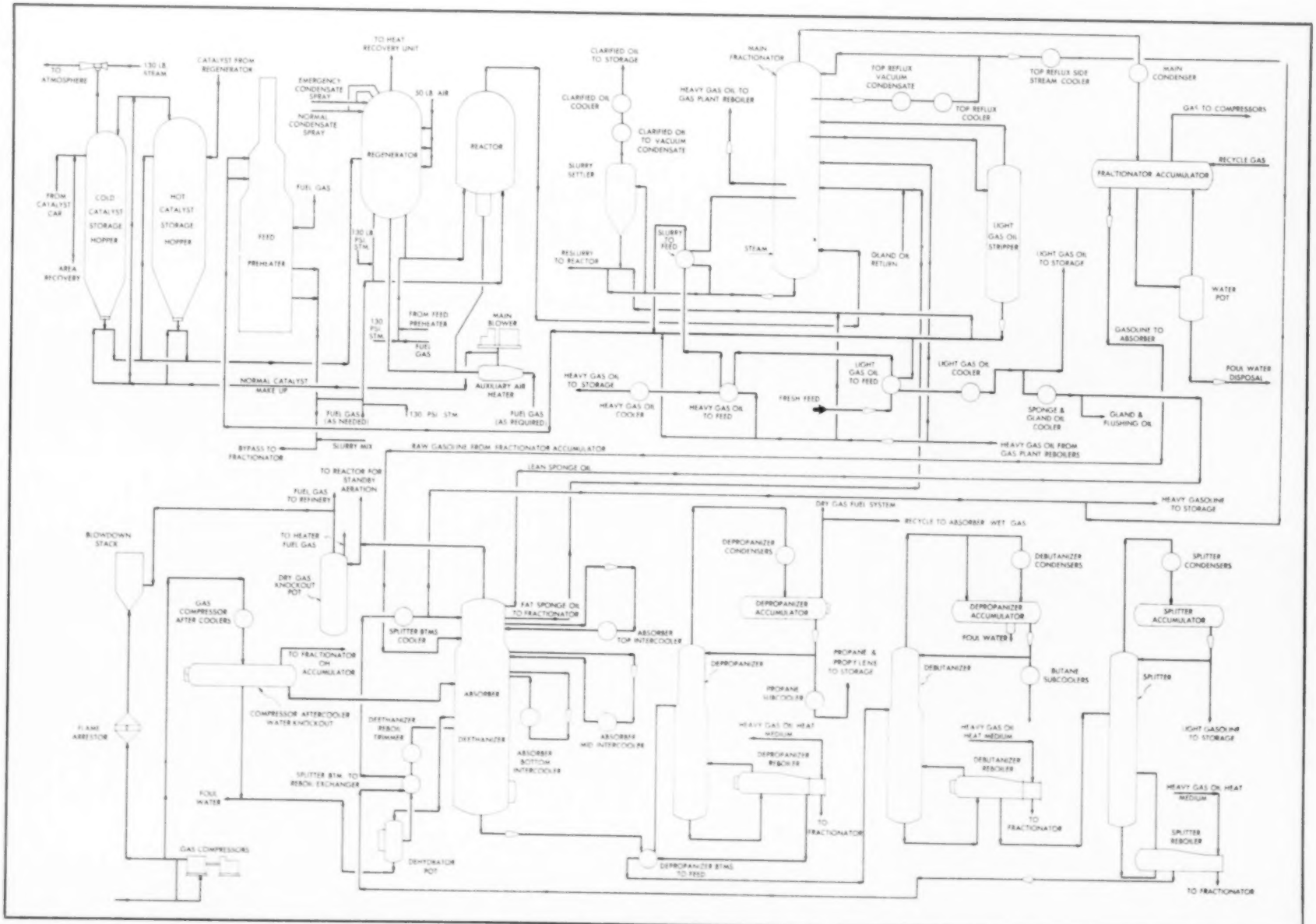
Fresh feed and recycle, heated in a series of exchanges with fractionating-unit stock and a final pass through the feed preheater is charged into two catalyst carrier lines at a temperature of 750° F. At the same time, 130-lb. dispersion steam is injected into each carrier line at the rate of about 5,000 lb. per hour and this mixture of oil and steam is joined with hot catalyst which enters the carrier lines through conventional standpipes from the regenerator. The catalyst is at a temperature of about 1,070° when it meets the oil-steam stream and catalyst-oil ratio is held to about 10 to 1.

The two carrier lines, which carry the catalyst and vaporized oil-steam into the reactor, just below its grid, have an inside diameter of 48 in. each and are internally coated with a 3-in. heat-resistant lining. The reactor has a 35-ft. i.d. and a 47½-ft. height between head seams, with a hemispherical top. It has a concave bottom which extends 9½-ft. below the bottom head seam, with the entire reactor being alloy lined and externally insulated.

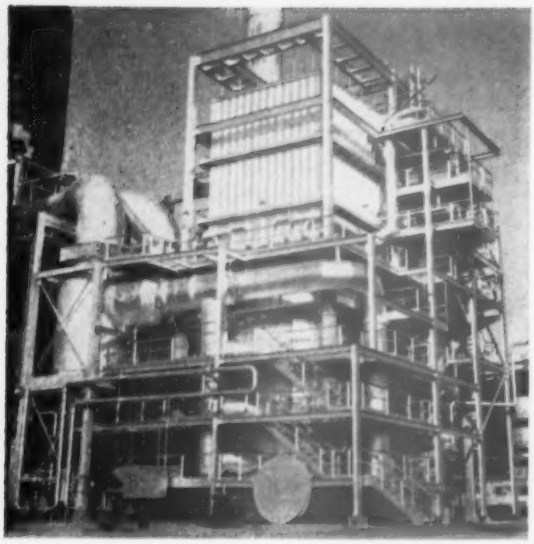
Bed level . . . An interesting feature of the reactor is its means of bed level control, which employs a central stripping well with outlet holes controlled by plug valves, to regulate catalyst height.

The well has a 14-ft. i. d. and extends upward 20 ft. above the reactor grid. Ten holes have been cut in the well, with four being at grid level, two at the 5-ft. level, two at the 10-ft. level, and two at the 15-ft. level. These holes may be closed off as desired by means of hand-operated valves so as to control the bed level in 5-ft. increments. Thus, if it is desired to operate the bed at grid level, all valves would be open, and catalyst will leave the reactor and enter the well through the holes at the next 5-ft. level. With the 20-ft. height of the well, it is possible to maintain a 20-ft. bed above the grid. Each valve stem on these plug valves has gas bleeding through an orifice into the stuffing around the stem at the vessel wall to keep catalyst from cutting the stem.

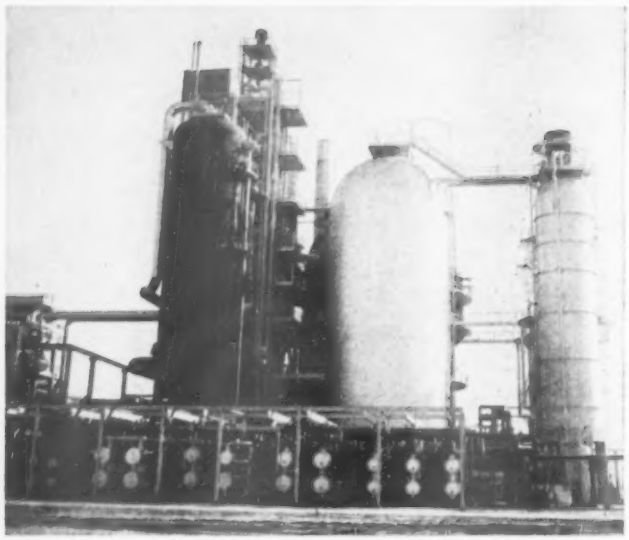
Stripping section . . . Of equal interest is the lower portion of the overflow well which makes up the stripping section and into which flows spent cata-



Simplified flow sheet of new cat cracker and gas-recovery plant at Sinclair Refining Co.'s Houston plant. The cat cracker charges 40,000 bbl per day of fresh feed and 10,000 bbl. daily of recycle.



Closeup of CO boiler used to recover heat from flue gases. Boiler is so designed that it can operate at two-thirds capacity as a conventional boiler.



Battery of heat exchanges in foreground have individual monorails and hoists for pulling tube bundles. In background is fractionator and hot and cold catalyst hoppers.

lyst from the reactor. This stripper has been divided into 20 individual cells in which steam is commingled with downflowing catalyst from which it removes entrained hydrocarbons. With individual steam supply being injected into each cell, more intimate contact is achieved which improves recovery of hydrocarbons from the catalyst particles.

The stripping section has a 4-ft.-diameter cylinder located in its center, with the top portion closed off. A hollow cylinder was welded midway between the outer wall of the internal dummy cylinder and the wall of the stripping portion of the overflow well. Thus, there were two annuluses formed between the dummy cylinder and the two concentric cylindrical walls. The space in these annuluses was divided up into 20 individual cells and a ring header located in the bottom of the stripper to provide 20 steam-injection points, each at the bottom of its individual cell.

Total stripping steam required will be about 30,000 lb. per hour of 130-lb. steam, which will be injected into the ring header. To insure that each cell is functioning properly, each is equipped with a flow and temperature recorder. In addition, a hand-operated throttling valve is provided on each cell so as to regulate its individual flow of steam.

Standpipe . . . Catalyst level in the overflow well, which is held automatically by the slide valve in the standpipe leaving the reactor, is maintained about 2 ft. below the grid and 5 ft. above the stripping section. This lined standpipe has an i.d. of 57 in. and extends downward for 40 ft., where it joins the 100-in. i.d. spent catalyst carrier line to the regenerator. Steam is admitted to three points in the standpipe to prevent packing of the downcoming catalyst. The steam passes through a small orifice, then through a valve and thence to its injection point.

The standpipe aeration steam enters at one point located just above the slide valves and at two other points further up the pipe. Flow of the steam will be adjusted by the valves to maintain the proper degree of aeration.

Catalyst recovery . . . Overhead vapors from the reactor, which flow to the main fractionator, first pass through eight single-stage cyclones, then on into the plenum chamber and to the fractionating section. The eight cyclones are connected to a common dipleg which carries recovered catalyst back to the bed in the stripping well.

A damper, slightly above grid level in the dipleg, may be used to control the height of the catalyst standing in the leg, to insure that enough static head is present to prevent carryback of catalyst through the cyclone system. The height in the dipleg is measured by a differential pressure cell connected to two taps in the dipleg.

Catalyst fluidity is maintained in the dipleg by injection of steam into aeration points at cyclone hoppers and top and bottom pressure taps on diplegs.

Regenerator System

The regenerator is a quite massive vessel, having a 56-ft. i.d. and a 32-ft. 3-in. height from head seam to head seam, with both top and bottom being capped by hemispherical heads. The vessel has a 4-in. internal lining, with 3 in. being made up of insulating material and the fourth inch being a refractory lining.

Spent catalyst from the reactor standpipe passes through its slide valves and into the 100-in. carrier line where it is picked up by an incoming air stream and carried upward into the regenerator. This carrier line, like the other, is lined with a 3-in. heat-resistant coating. Velocity in the carrier lines is about 35 ft. per second with a catalyst loading of 2 lb. per cu. ft.

The spent-catalyst riser enters the bottom of the regenerator where the incoming catalyst-air mixture impinges against an inverted distribution cone supported directly above the entry point. A 24-in. line, meanwhile, carries additional air required for combustion into the bottom of the regenerator where it passes through a distribution coil located below the grid. This bypass line equipped with a butterfly valve permits a degree of control in the regenerator riser velocity and catalyst loading in the line.

The catalyst-air mixture passes through the distribution grid, with the catalyst settling into a 15-ft. bed above the grid. The flue gases leaving the regenerator are quenched to 1,000° F. with condensate and then pass through the catalyst-recovery system into the plenum chamber and then out through the stack connecting to a heat-recovery unit.

Distribution grid . . . A unique method has been used to support the flat distribution grid in the regenerator. This entails the use of a metal skirt around

the edge of the grid, which is used both to support the grid and also acts to absorb some of the stresses set up due to temperature differences between the grid and regenerator shell.

Since the outer skin of the large-diameter regenerator is exposed to atmosphere, there is naturally a quite prominent temperature difference between the grid and the outer shell. With the grid welded to rigid supports, which in turn would be welded to the internal side of the regenerator shell, the temperature stresses would be of such a magnitude so as to contribute to an early failure of the welds. The skirt is designed to alleviate such a condition.

The grid itself is about 3 ft. less in diameter than the regenerator, and the skirt extends about 6 ft. downward around the periphery of the grid. The lower edge of the skirt is welded where it comes in contact with the hemispherical bottom of the regenerator. This portion of the regenerator is somewhat cooler than the grid, and as the regenerator maintains operating temperature, the expansion is naturally greater at the top of the skirt, which then bows out, absorbing stresses set up due to the temperature differences.

Cyclone diplegs . . . The regenerator is equipped with 16 two-stage cyclone separators. Each primary stage cyclone has its individual 8-in.-diameter dipleg, while the secondary cyclones are paired so that only eight diplegs are required. All diplegs extend downward and terminate just above the grid.

Stainless-steel aeration tubing runs parallel to each primary dipleg so that air may be injected in the lower portion of diplegs. This air is used to maintain fluidity in the catalyst column within each dipleg, but high pressure may also be applied to unplug the dipleg, should it be required. A drilled gate valve is used to restrict the air flow into the dipleg. When the leg becomes plugged, the valve can be opened and the leg blasted free. This aeration tap is also used to show the pressure existing at the aeration point, which will indicate if the line is plugged or the aeration too great.

Manually operated dampers are located near the bottom of each secondary dipleg, to insure a seal on start-ups. These dampers will be closed until a suitable bed level is achieved in the regenerator, at which time they will be opened and the normal seal of both the bed and the catalyst column in the dipleg will be in effect. During the period of bed buildup, the primary stage cyclones will have a relatively poor efficiency, but the second-stages will function to drop back the more than normal amount of carryover catalyst.

Each of the secondary diplegs has a bottom aeration and pressure point, an aeration and pressure point just below the joining "Y", and an aeration point in the cyclones hopper. If too much catalyst leg builds up so as to cause plugging, the diplegs may be blasted by opening the drilled gate valves controlling the aeration at the bottom and middle injection points.

As the catalyst bed builds up, regenerated catalyst is gathered into two hoppers extending above the grid. The catalyst is then carried from the hoppers downward into two 40-in. i.d. lined standpipes and then into the catalyst carrier lines. The two standpipes are equipped with the conventional two slide valves which are used to control catalyst flow to the reactor, and hence the reactor bed temperature.

The slide valves are automatically controlled by the bed temperature controller in the reactor. A change in temperature will change the amount of hot catalyst admitted with the oil vapors and thus affect the conversion. The regenerator slide valves are synchronized so that they will admit the same amount of catalyst to each reactor carrier line.

The regenerator standpipes are aerated at two levels with 45-lb. air, the bottom point operating to automatically hold a set differential pressure across the standpipe. The top aeration point will be manually set so the control valve on the bottom aeration point will be in the proper operating range.

The bottom aeration point operates automatically to hold a certain pressure differential across the standpipe. All valves in the manifold on the aeration ring are wide open, and the control valve operates to give an upstream air pressure to hold a density of 35 lb. per cu. ft. A differential pressure controller has taps above the slide valves and at the top of each standpipe. Air is automatically added so that this differential is maintained in keeping with the average catalyst density of 35 lb. per cu. ft. desired in the standpipe.

Flue gases are sprayed with condensate prior to entering the cyclones, with 12 retractable sprays used in this portion of the regenerator. Four additional sprays are located in the plenum chamber, and outgoing gases are held to a temperature of 1,000° F. in leaving the regenerator through an 86-in. lined duct connected to a heat recovery unit. Twenty emergency sprays—16 ahead of cyclones and 4 in the plenum chamber—are also included in the regenerator.

Regenerator pressure is controlled by three valves located in the outgoing flue gas duct. The first two valves are hand-adjusted restriction orifices that can be manually set to take some of the pressure drop so as to avoid turbulence, high velocities, and excessive wear across the main valve. Each of the restriction valves has two slides with operating mechanism controlled from each side. The opening of these valves can never be less than 60 per cent of the total opening across the duct.

The third, and main valve, is hydraulically operated and acts to hold the regenerator pressure at the desired point. This valve has two sliding gates and the controls are synchronized so each will be in the same position as the other at all times. This valve is so designed that it can never be closed over 40 per cent of the total opening in the duct. Exhaust steam is used to aerate all three valves to prevent catalyst from eroding the stems.

TABLE I—NEW CATALYST UNIT FEED AND PRODUCTS
(Design Conditions)

Feed	B/D
Virgin gas-oil	40,000
Recycle	9,700
Products	
Light fluid gasoline	15,300
Heavy gasoline	1,800
Light gas-oil	4,400
Heavy gas-oil	6,000
Propane-propylenes	2,300
Butane-butylenes	6,300
Clarified oil	1,200

OPERATING CONDITIONS
(Design Specifications)

Regen. coke-burning capacity — 40,000 lb./hr.
Regen. superficial velocity—1½ ft. sec.
Catalyst circulation rate—55 T/M
Regen. operating temp.—1,070° F.
Regen. flue gas temp.—1,000° F.
Regen. flue gas discharge press.—11.5 psig.
Unit feed temp.—750° F.
Injection steam—10,000 lb./hr. 130-psig steam
Reactor temp.—970° F.
Stripping steam—30,000 lb./hr. 130-psig steam.
Catalyst—Filtrol natural, Filtrol SR.
Catalyst inventory—Reactor 320 tons.
Reactor stripping well and standpipe—56 T
Regenerator—856 tons.
Catalyst-oil ratio—10/1.

Fractionation

Hydrocarbon vapors from the reactor are charged to the main fractionator, where they are received just above the bottom level. With some catalyst being carried over in the vapors, a large volume of the fractionator bottoms is used to preheat fresh feed to the reactor, and the return stream from the exchangers is fed back into the fractionator above the baffles to scrub catalyst out of the rising vapors.

Concentration of catalyst is achieved by this recycling effect, and a side-

stream of 475 bbl. per day is withdrawn from the bottoms recycle stream and charged to the slurry settler. From here, overhead clarified heavy oil is withdrawn for use as fuel and the settled bottoms, containing recovered catalyst, are charged back to the reactor.

A heavy gas-oil stream is withdrawn from tray No. 10 and used as a heat medium for the gas-plant reboilers before being released to the field for thermal cracking. Approximately 6,000 bbl. per day of heavy gas-oil is produced.

A light-cycle gas-oil stream is withdrawn from No. 16 tray and charged to the upper section of its sidestripper. From here, overhead is recycled to above No. 17 tray and 4,420 bbl. per day of stripper bottoms is charged to storage. A naphtha stream is refluxed from No. 23 tray to above No. 26 tray, with 1,776 bbl. per day being withdrawn to heavy gasoline storage.

Raw gasoline meanwhile is withdrawn overhead from the fractionator, condensed, and collected in the fractionator accumulator. From here, 14,760 bbl. per day of condensate gasoline is charged to the upper section absorber in the gas recovery unit. Accumulator overhead gas — 27.1 M.s.c.f.d — is compressed and charged to the absorber somewhat below the raw-gasoline entry point.

In the absorber, downflowing liquids are trapped in the bottom tray, from where they are cycled through heat exchangers to enter the tower below the bottom tray. The return temperature is set so as to give an essentially ethane-free bottoms product. The upgoing vapors are contacted with cooled naphtha, from the splitter, which is fed into the top section of the absorber. In addition, three intercoolers are used to obtain maximum cooling of the top section of the tower, with temperatures and pressures set to minimize loss of propane in dry gas.

The bottom intercooler recycles liquid from No. 21 tray to No. 22 tray; the midintercooler recycles liquid from No. 29 tray to No. 30 tray; and the top intercooler recycles between Nos. 42 and 43 trays. Light cycle oil is used as sponge oil across the top four trays to absorb any entrained liquid leaving with the dry gas.

Absorber bottoms are fed to the depropanizer where 2,300 bbl. of liquid propane-propylene is recovered overhead. Depropanizer bottoms, in turn, are charged to the debutanizer where 6,300 bbl. of liquid butane-butylene is taken overhead. Finally, the debutanizer bottoms are charged to the splitter where 15,300 bbl. of light fluid gasoline is taken overhead, with the bottoms released for absorption oil, for cracking stock, or for gasoline use.

The CO Boiler

One of the new and unusual features of the fluid unit is the waste-heat CO boiler, which not only generates sufficient steam to run the entire fluid unit including its gas plant and all of its auxiliaries, but supplies about one-third of its capacity in excess for the rest of the refinery. The boiler is so designed that it can operate at substantially two-thirds capacity as a conventional boiler. This makes the fluid unit entirely independent of any refinery steam upset, and the fluid can be brought on and off stream without the aid of steam from any external source.

The combustion gases from a fluid regenerator contain a tremendous quantity of sensible and potential heat. The sensible heat of the 1,000° F. gases is readily recovered by many fluid units with a shell-and-tube waste-heat generator. Until the Houston fluid, no unit had been designed or built to recover the potential heat in the carbon monoxide content of the gases.

Carbon monoxide is inherently present in the regenerator exit flue gases due to incomplete combustion in the regenerator. The incomplete combustion results mainly from two factors: (1) low excess air and (2) low combustion temperature.

Briefly, the CO boiler is composed of the following equipment:

1. A primary all refractory pressurized cylindrical furnace where the CO-bearing gases from the regenerator are thoroughly mixed with auxiliary fuel and air by tangential firing and raised to combustion temperature.

2. A secondary pressurized furnace where combustion is completed consisting of a water-well section for radiant heat absorption.

3. A single-pass pressurized two-drum boiler.

4. A pressurized economizer which further exchanges the heat in the boiler exit flue gases with the incoming boiler feed water.

5. A forced-draft cold-air fan to supply the necessary air for the auxiliary fuel and CO if required. No induced draft fan is required because the entire unit operates as a pressurized boiler.

6. All necessary instrumentation and standard appurtenances, such as gage glasses, feed-water control valves, pressure gages, meters, stack, etc.

The advantages of the CO boiler are many. The boiler allows the fluid unit to "lift itself by the boot straps" as it can start up and shut down without an external source of steam. It conserves a major portion of the sensible heat in the exit flue gases from the regenerator. It burns and conserves all of the heat in the CO. It precludes the possibility of allowing to escape from the unit any unburned gases to the atmosphere. It saves fuel as only a relatively small amount of auxiliary fuel is required.

Respray Steam Superheater

Another new feature of the unit is the respray steam superheater. The CO boiler is not equipped with a steam superheater, and to superheat the steam a four-stage series superheater is immersed in the fluidized bed of the regenerator. The steam as it passes through the superheater can be desuperheated at the outlet of each stage by spraying condensate into a desuperheater or steam attemperator. These desuperheaters allow for complete control of the steam temperature as desired.

In addition to superheating the steam it is possible to very carefully control the regenerator bed temperature. This is easily done by automatically controlling the quantity of steam passing through the superheater and/or control the extent of desuperheating. An accurate control of the regenerator bed temperature provides more and better products. The respray steam superheater therefore does double duty: it controls the steam temperature and also controls the regenerator bed temperature.

Maintenance provisions . . . An interesting feature of the cat cracking unit is the great number of provisions included in its construction to simplify routine and major maintenance work.

Clearances were provided throughout the unit to permit hoist trucks and other mobile equipment to drive within the unit confines. All overhead piping and supporting structures were elevated when crossing these access areas. Consequently, trucks may drive into the working area, pick up or deposit a load, and drive off, without the need of snaking out a load to the unit limits before picking it up.

The unit elevator was extended above the conventional height so that tools and equipment can be conveniently lifted to the upper reaches of the reactor and regenerator. With a lower elevator, as on many other units, it is necessary to lift equipment a considerable height above the elevator's top platform.

Heat exchangers are equipped with individual monorails and chain hoists, so that it is a simple matter to lift heads and pull bundles without the need of bringing in additional equipment.

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Boston, 10	1025-201 Devonshire St.	Los Angeles, 17	1523 General Petroleum Bldg.	San Francisco, 4	1554—200 Bush St.
Chicago, 4	2128 McCormick Bldg.	New York, 6	3347—165 Broadway Bldg.	Seattle, 1	1325 Henry Bldg.
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How to Develop Leadership

What are the fundamental traits of a leader, and how do you pick key men?

by George C. Houston

THE increasing complexity of present-day business, together with the recognition of the responsibility of management toward its employes, share owners and customers, and to the community at large, calls for a higher degree of leadership ability than was recognized in the earlier stages of industrial development. It is not enough to have capable leadership in the top-management group of a business. If your business is to be successful, it must have capable leadership at all levels of operation—from first-line supervision to the president of the company.

Top management develops, almost without exception, by growing from job to job. Providing adequate leadership in all functions and at all levels of the organization is one of management's most important jobs.

Under these circumstances it's essential that a progressive business organization have definite plans and procedures for selecting and developing men to fulfill the responsibilities of leadership, and to build a foundation for the future growth and development of the enterprise. Without such plans any business can be seriously handicapped.

Let's consider how we can approach this problem of developing effective leaders.

You have often heard the remark: "John is a natural leader." To be sure, there are certain basic qualities that an individual must have in order to fulfill leadership responsibility. Nevertheless, there is a vast difference between the type of leadership that might be effective in social or political organizations, or at the level of campus or fraternity life, and the exacting demands of leadership in the business situation. If you are to develop capable leaders in your business operations, you must first seek out men who have the fundamental qualities that indicate leadership potential. Then you must develop these qualities to permit their most effective utilization. The demand for leadership ability today is too great, and the need too important, to expect that an adequate number of capable leaders will develop by themselves—or that you'll ever have a sufficient supply of the so-called natural leaders.

Traits of a leader . . . Before discussing what can be done to develop leadership ability, let's first examine the fundamental qualities you should look for in the individual to whom you are willing to assign the responsibilities of leadership. In addition to the normal educational and work experience background requisite to a specific position, it is generally agreed that you look for the following 10 characteristics or **qualities.**

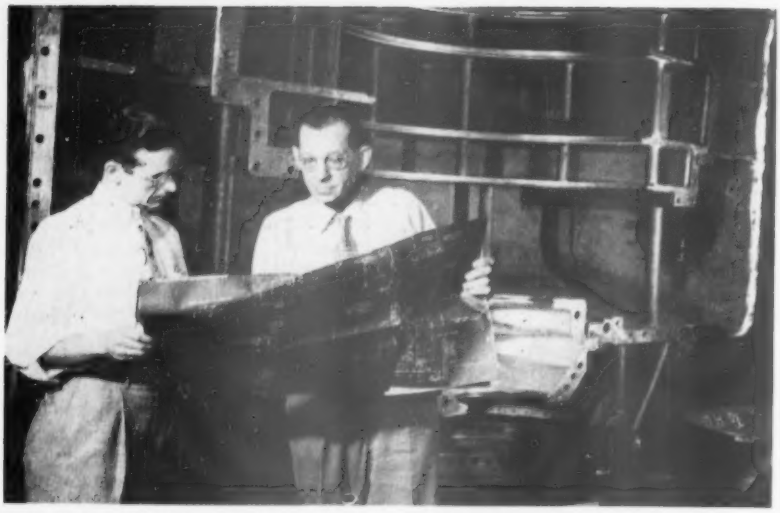
- Sound character and personal integrity.
- A well-balanced personality.
- Real interest in and understanding of people.
- Well-developed ability to think clearly and logically.
- Imagination and vision.
- Common sense and good judgment.
- Persuasiveness.
- Initiative.
- Clear-cut objectives or sense of purpose.
- Abundant energy to provide the drive essential to achieving objectives.

You might well say that this looks like a pretty large order. We agree that it is. Nevertheless, many people have these qualities in varying degrees. The problem is to find the individual with a sufficient amount of these fundamental qualities—even though he may not have learned to use them effectively—and then to assist him in using or applying these qualities to acquire the abilities essential to leadership responsibility.

What are the primary **abilities** that you expect of men you are willing to place in positions of leadership? We might list them as . . .

- Willingness to accept responsibility.
- Ability to command the respect, cooperation, and confidence of others.
- Ability to get at the heart of a problem and come up with sound plans or decisions.
- Ability to sell ideas, plans, or decisions.

Author is associated with the General Electric Co. Reprinted from General Electric Review, November 1953.



ROTATING ASSIGNMENTS help provide the broad background that today's leaders need. Trainee is working directly with a supervisor in a typical operation.

- Ability to organize men—and facilities—to translate plans and ideas into action.
- Ability to see ahead and understand the implications of decisions or actions.
- Ability to make decisions and to stand behind those decisions.
- Flexibility, or the ability to adjust to new trends or circumstances, and to honestly recognize and admit mistakes when necessary.

Selection methods . . . As mentioned, before you can proceed with any plan for the development of leadership qualities and abilities, you must first do an intelligent job of selecting the proper men for such training. This is so, particularly if you expect results commensurate with the degree of responsibility for which these men are to be developed.

This problem of selection is primarily a matter of collecting all the available information concerning an individual that will indicate whether he has leadership potential. By leadership potential we mean the extent to which he has the basic qualities we have listed, and also the degree that these qualities have been developed or may need to be developed. There are many ways in which you can acquire this kind of information.

Most of the men that you'll be considering as potential leaders will have already been part of the organization for a period of years. You have available their educational and professional backgrounds, as well as the record of such training as they may have received in formal or informal programs; you can obtain additional information by talking to persons who are well acquainted with the individual. Rating sheets and performance-evaluation reports are of real assistance in the investigation.

In some cases you may be familiar with the family background or with the individual's activities outside of the business situation, such as clubs, civic organizations, and church activities. His college record may indicate leadership ability during his undergraduate years. Reports that he has written may indicate whether he has obtained all the essential facts, analyzed them clearly and logically, and presented sound conclusions or recommendations.

In addition to obtaining as broad a pattern of information as may be available, it is also possible to develop further information and to form conclusions based on well-conceived interviewing techniques. Finally, you have available a variety of reputable testing services through which you can administer a properly planned group of psychological and aptitude tests. This way you can gain further insight into the personality of the individual, his emotional balance and control, the quality of his thinking, and the degree to which he possesses other desired qualities. The results of such tests, properly interpreted, can further add to the available information on which a decision can be made.

Development program . . . Once you have done a thorough job of evaluating the available information and have decided that the individual meets your requirements, you can proceed with a definite plan for his development. Leadership ability is not developed by attending lectures or by reading, even though such activities may be helpful in stimulating thinking and developing a higher degree of understanding. We believe, without qualification, that the only sound way to acquire and develop these abilities is through the process of learning by doing. Consequently, any well-conceived leadership development program is built around these principles . . .

- Provide opportunities in the work situation to practice doing those things required of men in positions of leadership responsibility.
- Associate with proved leaders.
- Adequately evaluate performance and give sound guidance and counseling along the way.

Each of the individual's assignments in his work situation should be supervised by a man who has already proved his leadership ability, who is genuinely interested in developing others, and who is familiar with the objectives of the assignment in relation to the needs of the candidate. The assignment should be planned to provide experience which will not only increase the candidate's know-how, but which will also provide an opportunity to strengthen his weak points or further develop his specific abilities.

The number and variety of assignments will, of course, depend on the kinds of experience that the individual needs in relation to the immediate objective. For example, if you wish to provide experience in analyzing a specific business problem, he may be assigned to a special study or project, where he can be judged not only on the basis of his ability to come up with sound conclusions and recommendations, but also to effectively present and sell his ideas. His ability to think clearly, deal with others effectively, and to adjust himself to new situations can be appraised on the basis of his performance in conferences and staff meetings. He can gain experience in organizing men and facilities by assignment to projects or jobs involving the organization of a new unit or the reorganization of an existing unit. His ability to command the cooperation and respect of others can be observed in many ways, including the manner in which he handles those who report to him, as well as in his dealings with his associates at the same level or those in positions of higher authority.

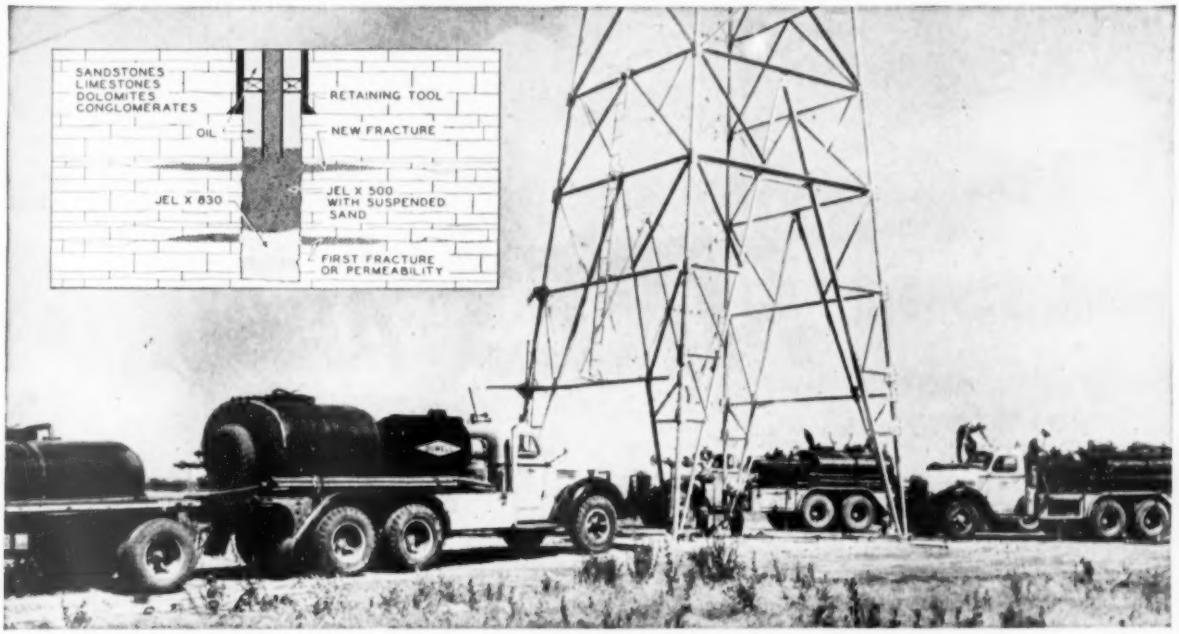
These are but a few examples. There are many ways in which opportunities for experience can be provided. There is no stereotyped pattern in this field. The differences in background and needs of each individual require that his course of development and the planning of his assignments be handled on an individual basis, taking advantage of all available opportunities to provide the required types of experience.

Role of supervisor . . . Finally, if you are to measure the results of such ex-

(Continued on page 119)

FIXAFRAC—TEMPORARY PLUGGING SERVICE—AIDS IN MULTIPLE FRACTURING TREATMENT

Production boosted from 2.3 to 65 BOPD; Fixafrac used to divert Stratafrac stages into different zones



Initial production from this well, after acidizing, was 50 barrels of oil per day. It declined over an 18-year period until production had fallen to 2.3 BOPD.

At this point, the operator decided to call in Dowell to determine how to increase production. Dowell's recommendation: a multiple fracturing treatment consisting of 1500 gallons of Stratafrac material and 300 gallons of Fixafrac material.

Dowell engineers performed the service, using Dowell trucks, equipment and fracturing materials. As a result of the treatment, the well swabbed 3½ barrels of oil per hour for 7 hours, after treating materials had been recovered. On pump, the well produced 65 BOPD.

Fixafrac is a temporary plugging service used between stages of Dowell fracturing and acidizing treatments to divert treating fluids into different sections. The material used in Fixafrac service, Jel X 830, carries suspended solids which react after treatment causing the material to liquefy and flow back freely to the well bore. No jel-breaker solution is needed following the treatment.

If you would like to know more about Fixafrac service, or any of the many other Dowell oilfield services, call the nearest Dowell office or write to Tulsa, Dept. B-11.

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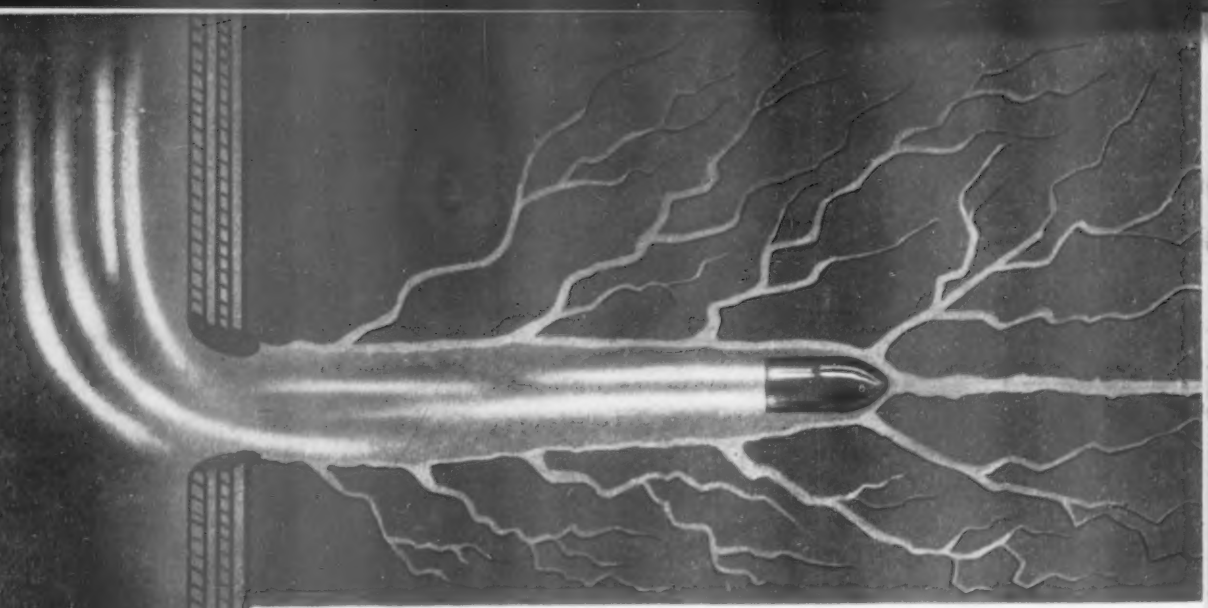

FIRES AROUND A

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- Penetrate FEET into tight formations . . . get extensive fissuring plus large-diameter casing perforations.
- A "MUST" before fluid fracturing or acidizing. Use the Formation Fracturing Tool and be sure the fluid is getting back into the formation . . . *in the desired zone.*
- Insure getting through excessive contamination . . . and *deep into the formation.*
- An efficient, down-hole junk shot . . . far faster than milling or drilling.

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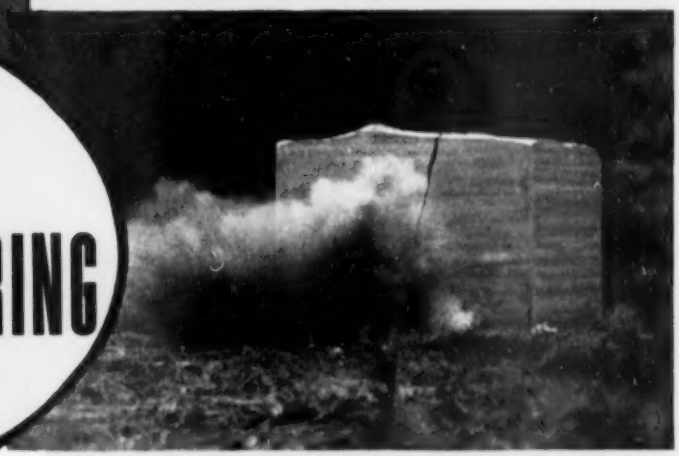
"Above-the-Ground" Tests Prove the Formation Fracturing Tool's Power

the new

Welex FORMATION FRACTURING TOOL

"CORNER" . . .



■ Thirty-thousand-pound block of aged concrete serves as target for missile of Formation Fracturing Tool. Notice fissure opening one millisecond after explosion.

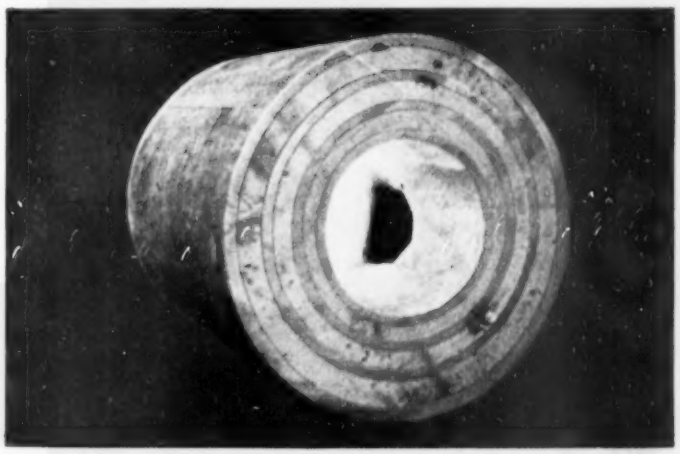
Now . . . with the Welex Formation Fracturing Tool . . . you're assured of positive results. Fired straight down your well or at a 90° angle horizontally into the formation . . . the tool delivers several hundred thousand foot pounds of directed energy . . . *where it counts!*

This powerful new tool fires a single round at terrific speed through the casing and several *feet* into the formation. You'll insure the results of every fluid fracturing and acidizing job with widespread fissuring . . . positive deep penetration exactly where you want it.

Dozens of field tests in both old and new wells . . . in open and cased holes . . . have already proved the Formation Fracturing Tool.

Developed by Welex . . . the same team that developed jet perforating . . . this revolutionary new tool offers a solution to your production problem in any formation. Call the nearest Welex District Office . . . our representative will explain how the Formation Fracturing Tool can help you.

■ Block of concrete pictured above after firing one round from this tool . . . indicative of the fracturing force you will obtain in your formation.



■ Another test shows clean, 2-inch hole through four strings of casing and cement. No burrs or interior casing damage remain after firing.

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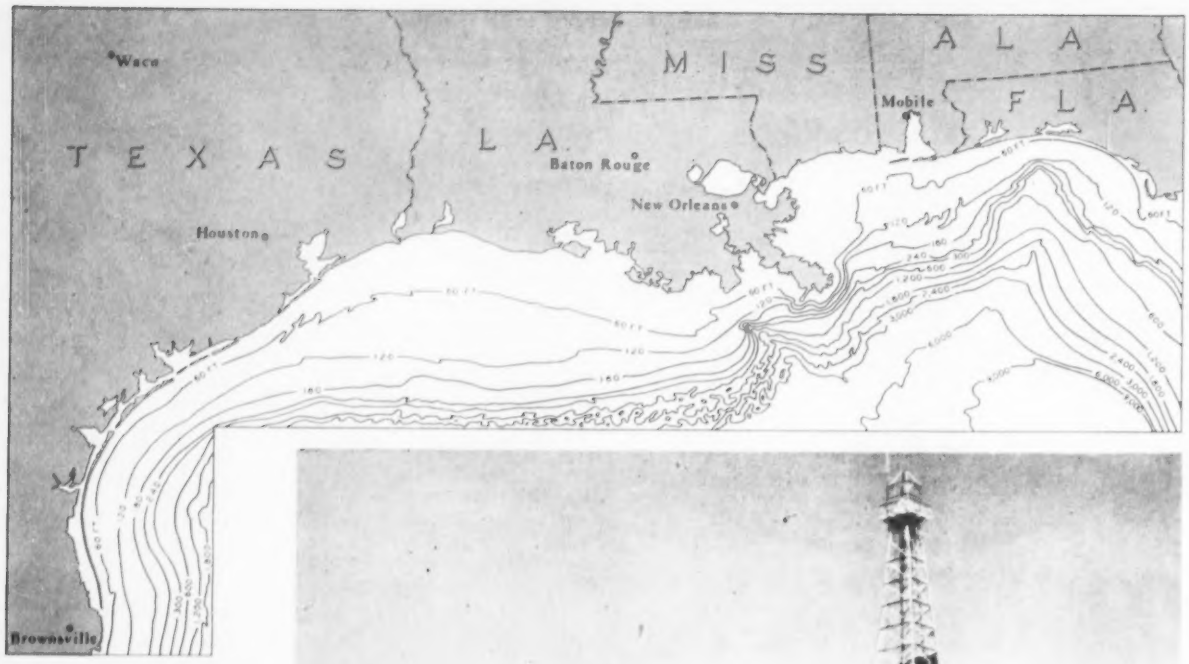
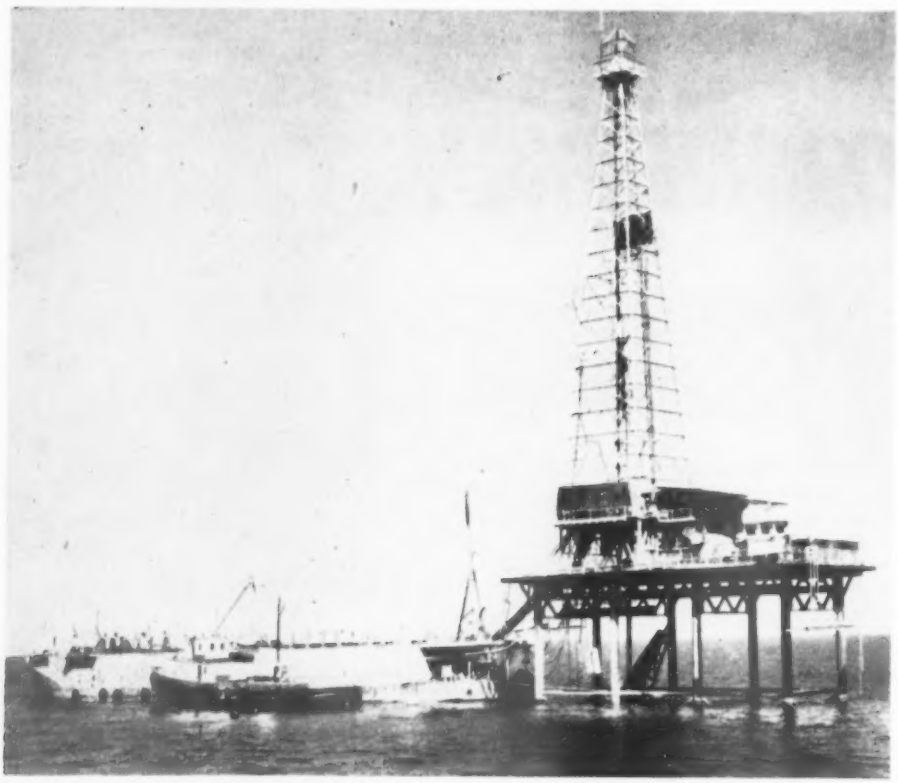


FIRST GOAL of offshore oil hunters is easily movable barge which will drill in 40 to 60 ft. of water. Strange devices are being dreamed up for even deeper waters.



FIXED PLATFORMS like this are all right for field development, too costly for wildcatting.

TO SEA, OR NOT TO SEA

Portable Rigs in Design Stage Will Drill in 60-Ft. Water

by Henry D. Ralph

Dramatic developments in mobile drilling platforms promise to slash cost of offshore exploration; race is on to find new way of wildcatting in deep water

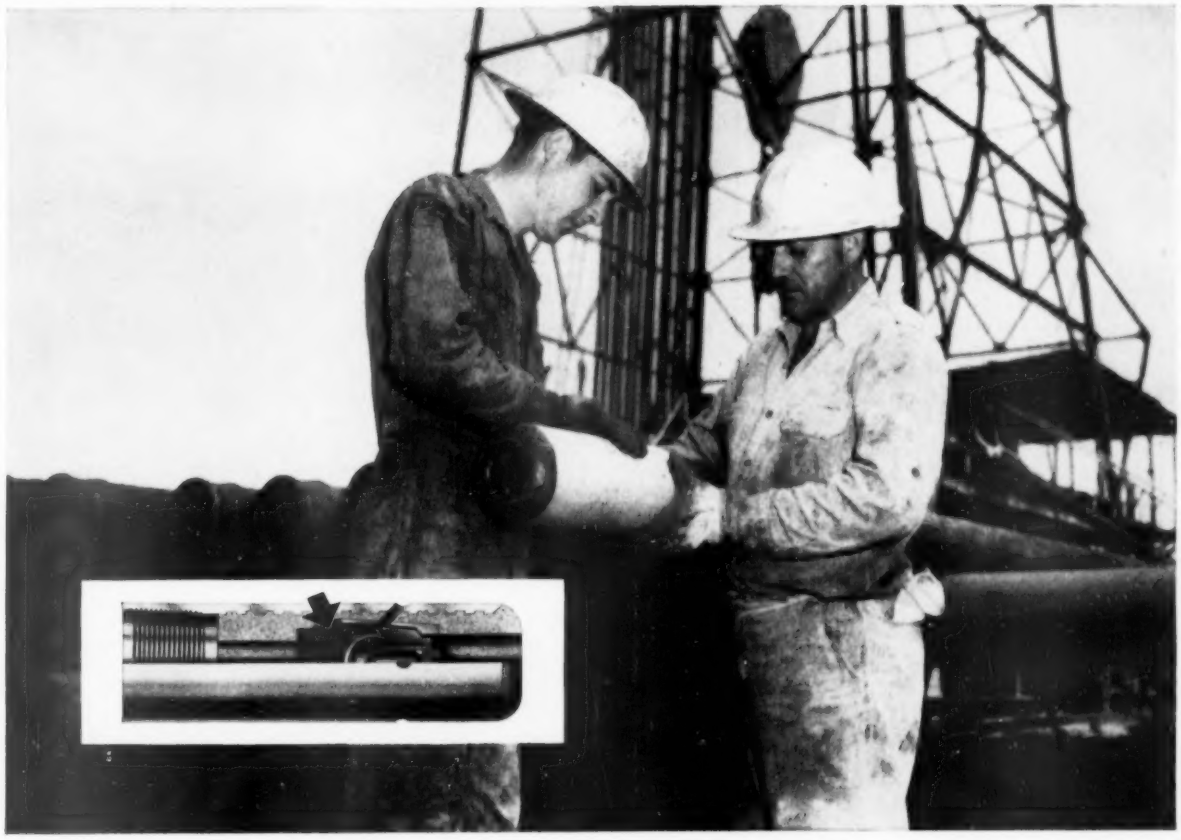
A FLEET of ingenious mechanical monsters will be exploring for oil and gas in the deeper waters of the Gulf of Mexico sometime in the future if the schemes of inventors, shipbuilders, and oil operators materialize.

At the moment there is something of a race to develop and put into use new types of floating drilling equipment which can operate in waters far deeper than any mobile drilling barge ever used in the past.

The challenge of offshore operations has spurred inventive genius, and all along the Gulf Coast one can pick up reports—most of them shrouded in great secrecy—of radically novel apparatus in various stages of design.

Another new development using

B. F. Goodrich Chemical *raw materials*



Davis Cement Float Shoe made by Davis-Lynch Sales & Engineering Co., Houston, Texas. F. H. Maloney Co., Houston, makes the Hycar-phenolic seat. B. F. Goodrich Chemical Co. supplies only the Hycar rubber.

FLOAT SHOE SEAT SEALS—AND FIGHTS HEAT, TOO!... with Hycar's help

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Most of these are still on the drawing boards or awaiting financial commitment from some oil company or drilling contractor. But they are all attracting a great deal of interest, for a number of oil operators are quietly but intensively working on plans to go after offshore oil in a big way now that the legal questions appear to be nearing a final solution.

Foremost in the race at the moment, it appears, is Ocean Drilling & Exploration Co. of New Orleans, a new company, which has just launched a mammoth drilling barge of original design. *(See "Even the Drilling Equipment Goes Under," beginning on page 96 of this issue.)*

Odeco hopes to have its rig fitted out and at work miles off the Gulf Coast by spring, which—so far as can be learned from the hush-hush plans of the many concerns involved—will make it the first company to put a new type of drilling rig into operation since the Supreme Court's "tidelands" decision called a virtual halt to offshore work 4 years ago.

Others in race . . . But others will be right on Odeco's heels. Kerr-McGee Oil Industries, Inc., Oklahoma City, and Southern Production Co., Inc., Fort Worth, are two companies definitely known to be proceeding with construction of new-type barges, and a great many other operators are making intensive studies of the subject.

All this activity is aimed at licking the one biggest obstacle in offshore operations—high wildcatting cost.

All offshore work is expensive, but what has worried the operators the most is the huge investment required for drilling exploratory wells in deep water.

What the industry has been seeking is a portable rig which can be moved from location to location easily and which does not require permanent construction until after the well has been proved productive.

The new deep-water barges promise an answer to this problem. Those of Odeco and Kerr-McGee are designed to operate in 40 ft. of water, and some still on the drawing boards are designed for depths of 60 ft. or even more.

There are two methods of drilling over water. In inland water, coastal bays, and in shallow waters close to the gulf shore the method long in use is to drill from floating barges which carry all the drilling equipment. At the drilling site, lower compartments are flooded with water so that the barge sinks and rests firmly to the bottom but leaving the top deck and superstructure sufficiently high above wave level. After completion of a well, such a barge is easily refloated and towed to a new location.

But, up to now, no submersible barge has been able to operate in water more than about 20 ft. deep.

Beyond that depth, wells have had to be drilled from platforms—manmade islands built up on huge pilings, and not at all portable. The famous double-decked platform which Humble Oil & Refining Co. built in 50 ft. of water 7 miles off Grand Isle, Louisiana, several years ago cost something like $1,200,000.

Barges moored to side . . . A later development was to build small platforms, just big enough for the derrick and draw works, generally with everything else—power house, mud pumps, and crew's quarters — on barges moored to the platform and rising and falling with the tide. This brings the cost of a platform down to the range of $200,000 to $500,000.

This combination of floating barge and fixed platform is satisfactory for development wells in a proven field, but it is an exceedingly high initial investment for a wildcat well which is just as apt to be dry as productive.

So the immediate plum in the offshore-oil pudding was the perfection of a deep-well mobile drilling method. The oil company or drilling contractor who could put such a device into use early in the game would have the jump on competitors.

Behind this race to develop new offshore rigs are some very detailed and elaborate economic and engineering studies. The companies which made these studies are holding them in strict confidence, but the general line of thinking involved is no great secret to those who have followed offshore operations.

These studies all reach the same conclusion: that there are excellent prospects for developing big oil and gas fields in the Gulf of Mexico and that the venture will be profitable if methods are devised to get a "look at the bottom" at reasonable cost.

Deeper and bigger . . . The geology of the Gulf Coast indicates this. The offshore formations are similar to those onshore, and the trend along the Texas and Louisiana coasts, in general, has been toward bigger discoveries the farther south exploration has progressed and the deeper drilling has gone.

The floor of the gulf tilts very gradually, and, on the average, the depth of the water increases about 6 ft. per mile out to 100 to 175 miles where the Continental Shelf drops off steeply. Off Louisiana, however, the water deepens only about 1 ft. per mile in many places, and it is in this region that the greatest discoveries have been made to date. The Texas coast drops more sharply, which is one reason why Texas has seen less offshore drilling.

Leasing costs offshore are generally lower than on land, and the operator has the advantage of obtaining a large area in a unit without checkerboarding or the need to deal with a large number of landowners. This reduces the costly problem of offset obligations and close spacing, and permits fields to be developed as a unit.

Geophysical operations also are usually lower per acre when conducted on a large scale. Costs per crew-day are much higher than on land because of the heavy investment in boats and the radar equipment for determining locations, but the work proceeds rapidly when under way.

Thus an operator can obtain leases and conduct seismograph work at costs no higher and perhaps lower than similar operations on land. And once a field is discovered, the cost of development wells is not prohibitive because several may be drilled directionally from a single platform. Even though offshore fields are apt to be at considerable depth, the formations are such that drilling usually is very rapid.

Wildcatting costly . . . The missing link to financial success, up to now, has been an economical method of wildcatting in deeper waters.

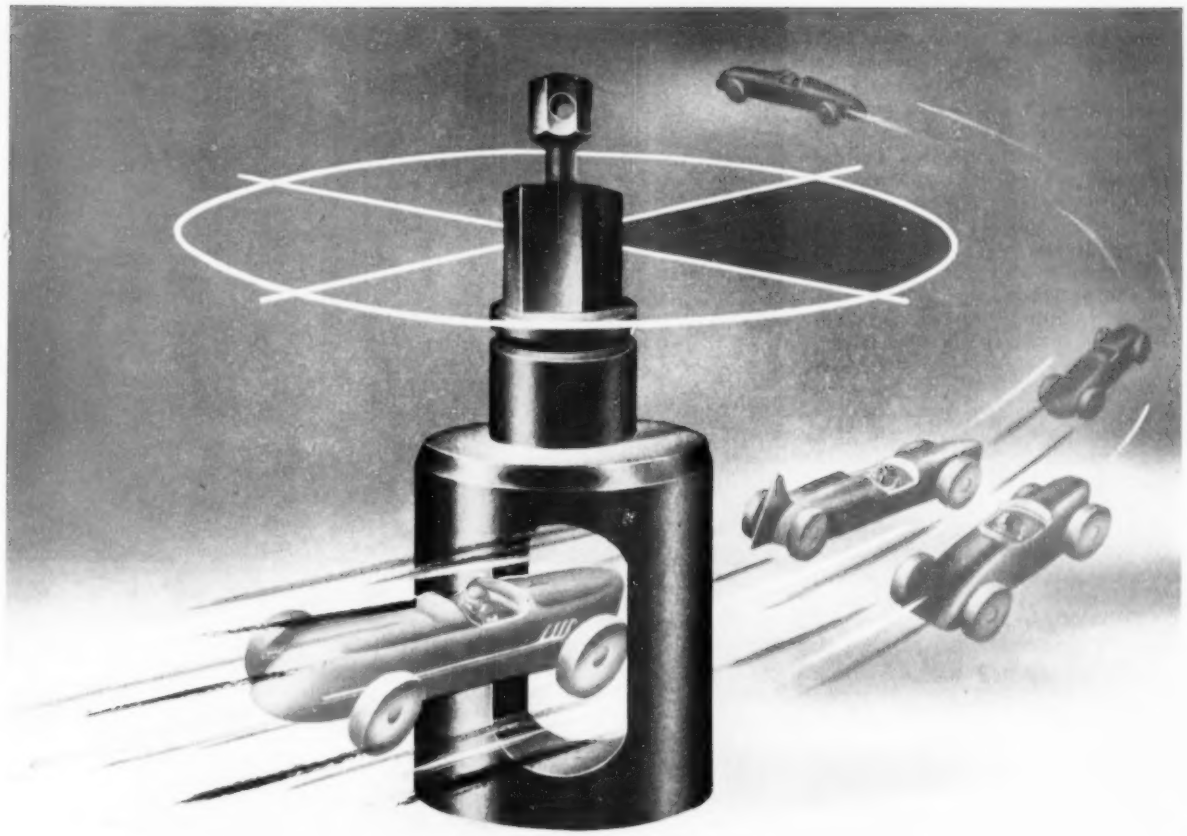
Mobile barges plus great reliance on electric logs now promise to supply this need, and presage a big drilling campaign during the next few years.

The new deep-water barges are enormously expensive, but if steadily employed they can drill a wildcat in short order and move on to a new location with a minimum of time and expense. Because of the nature of the Gulf Coast formations, electric logging methods are extremely dependable—something not true in many other areas such as West Texas. This makes it possible for an offshore operator to evaluate the potentialities of a new wildcat without going to the expense of setting casing and testing the well.

The theory of most offshore operators is that to get a payout they cannot afford to fool with small producers and marginal fields, but must concentrate on the big pays. So if a wildcat doesn't look promising after a quick "look at the bottom" with an electric log, the hole will be plugged without the necessity of building a permanent structure on pilings, and the rig will quickly be assigned to another test.

For the most part, oil and gas in this area are found on salt domes, which are easily located by geophysical methods, and six to a dozen wildcats nor-

(Continued on page 121)



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Because of this outstanding combination of features, A.C.F. CYLINDRICAL Lubricated Plug Valves are safely and efficiently handling gasoline, oil, air, gas, vacuum, acids, caustic solutions, chemicals and many other fluids.

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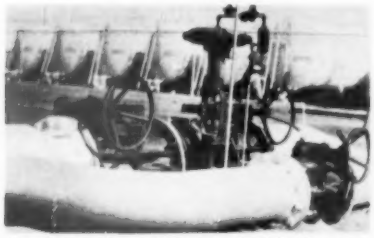
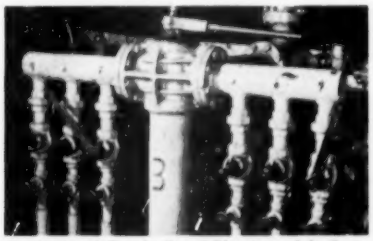
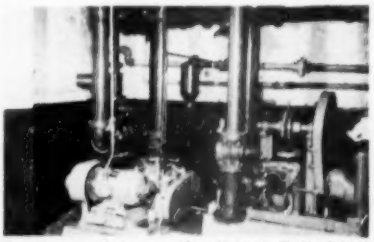


In the Petroleum Industry the full pipe area of the Cylindrical Plug provides capacity flow.



On Natural Gas in Steel Plants, quick shut-off and 'turn on' provides positive and immediate control of flow.



In Sewage Plants, the A.C.F. Cylindrical Plug shears obstructions, keeps sludge lines open.

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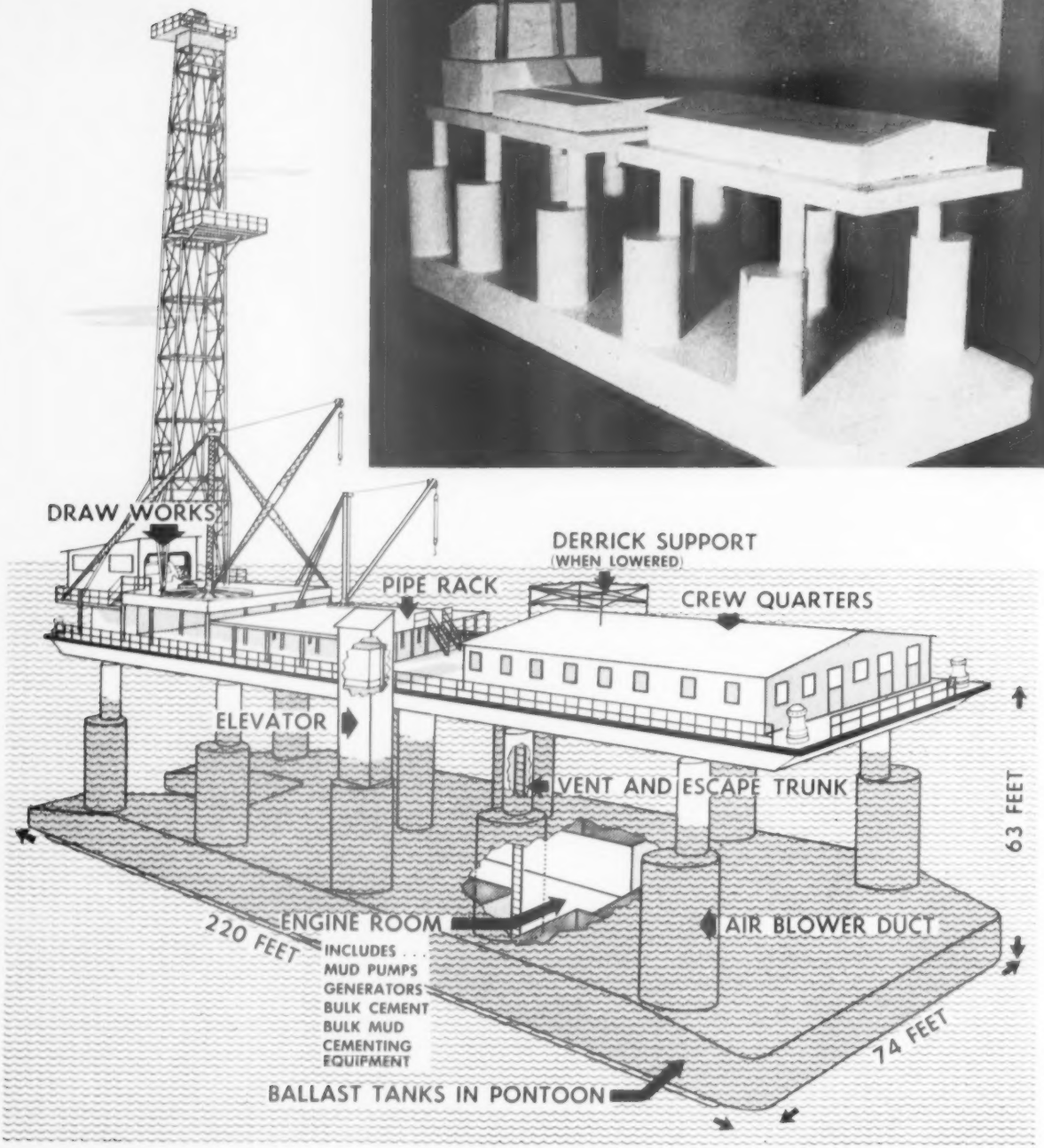


NEW APPROACH TO DEEP-WATER DRILLING

Even the Drilling Equipment Goes Under

by William P. Sterne
Gulf Coast District Editor

BARGE FEATURES . . .

- It is submersible and can drill in 40 ft. of water.
- Its engine room is contained in a steel hull which is sunk to the ocean floor during drilling operations.

A NEW-TYPE drilling barge which sinks its own engine room to the bottom of the ocean is one of the latest approaches to the problem of successfully drilling over deep waters in the Gulf of Mexico.

This submersible diesel-electric barge, owned by Ocean Drilling & Exploration Co., of New Orleans, is now undergoing final outfitting at Alexander Shipyard, Inc., in New Orleans. It is expected to go into service on a contract basis late in the spring, and its first job is slated for a major oil company off the Louisiana coast.

Radical changes in design and operation are features of this barge:

1. Its construction marks the first time that such a barge has ever been built which calls for the actual submergence of the drilling equipment itself.

2. It is huge compared with submersible-type barges now being used to drill in shallower waters: 220 ft. long, 74 ft. wide, and 63 ft. high from the upper deck to bottom of the lower hull. The entire unit has a displacement of 3,700 tons with all equipment.

3. The barge has been designed to operate efficiently in waters up to 40 ft. deep, an extremely important factor, inasmuch as renewed drilling in the Gulf of Mexico is expected to be done over much deeper water than heretofore.

4. The unit is completely integrated, consisting of (a) an upper deck section containing the drilling mast, draw works, pipe rack, active mud pits, a crane and pile-driving equipment, and living quarters for the crew; (b) a huge hull or "pontoon" section, containing the engine room, which is separated from the upper deck section by (c) large-diameter steel caissons. All components are welded into one unit and remain stationary with respect to each other at all times.

5. In addition to the diesel engines and generators, the engine room contains mud pumps, cementing equipment, and storage bins for bulk cement and mud. This unit is completely submerged within a steel shell during drilling operations.

6. By installing major machinery in the bottom hull, the barge's center of gravity has been so lowered as to make submerging, raising, and moving from one location to another relatively easy and without danger of capsizing.

7. Added protection is afforded rig equipment, in that the slot, and the drilling floor, are located as remotely as possible from the engine room. Thus, in case of a blowout or other accident, all of this equipment, with exception of regular rotary-rig components on deck (such as draw works, mast, rotary, swivel, etc.) would be under water within the 5/8-in.-thick steel hull and probably escape damage. Likewise, the living quarters are located some 150 ft. from the drilling well, providing maximum safety to personnel.

8. The short slot will enable better positioning of the barge over the actual well site (i.e., on standard-type barges, the drilling position is near the center of the barge, and the entire unit, if rotated to avoid any underwater obstacle, is still in much the same relative position over the well site). However, the Odeco barge, with its short slot and drilling position toward one end, can be oriented to occupy different positions on the bottom relative to the well, and still be in drilling position.

9. The barge is equipped with a 20-ton crane and air-operated pile-driving equipment. This can be used to build protective structures within the slot after a well has been completed and while the barge is still on location.

10. Access to the engine room which, during drilling, is beneath the ocean, will be made via an elevator through one of the caissons. The engine room is adequately ventilated by powerful air blowers which inject air into one caisson, down to the hull section, then up another caisson which also serves as a vent for engine exhausts.

11. Towed to location, the integral unit will be lowered into the water by means of ballast and sea cocks as is usual for submersible-type barges. The large-diameter caissons providing adequate stability at the water line, since weight of the heavy machinery is within the bottom hull section. The top platform remains completely stationary in relation to the bottom hull at all times, and in operating at maximum depth of 40 ft., there will be a clearance of about 23 ft. from water line to the top platform.

Unique design . . . This is the first drilling barge which has been designed and built, calling for the actual sinking of drilling equipment beneath the surface of the water. This, submerging of equipment is the most unusual feature of Odeco's barge.

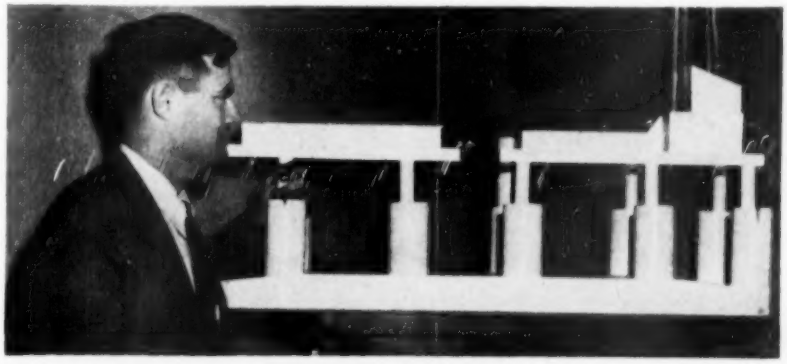
Many ideas now on drawing boards call for a barge which consists of a top section and lower "jacket" or section, connected to the first with caissons. However, these caissons are not stationary as in Odeco's barge, and there is usually some sort of hydraulic or winchlift arrangement which is required to sink the lower section into the ocean mud. The top deck of these projected barges thus stays on the surface, and the jacket extends to the necessary depth via hydraulic jacks or winches, etc.

It must be kept in mind that Ocean Drilling uses no such divided-section arrangement, but that the unit itself is completely integrated.

Adapted from Hayward . . . Ocean Drilling & Exploration Co.'s new barge is an adaptation of a plan which was conceived by John T. Hayward, formerly an engineer for the old Barnsdall Research Corp. in Tulsa. *(See Sea Drill Starts Operation in Gulf of Mexico," by John T. Hayward, The Oil and Gas Journal, May 19, 1949, p. 246.)* Ocean Drilling has a license from Hayward, and the latter served as a consultant during the design work and construction of the new barge.

A number of improvements and innovations have been built into the barge by Ocean Drilling's president, Alden J. Laborde, of New Orleans. Laborde is a naval engineer and a graduate of the U. S. Naval Academy. He formerly served with Kerr-McGee Oil Industries, Inc., of Oklahoma City, as marine superintendent for Gulf of Mexico operations.

Mast . . . The barge is fitted with a Lee C. Moore 140-ft. cantilever-type mast which has a gross nominal capacity of 1,035,000 lb.—far above A.P.I. specifications. It can rack up



Allen J. Laborde, president, Ocean Drilling & Exploration Co., New Orleans, looks over a model of his company's drilling barge, which is now undergoing final outfitting at Alexander Shipyards in New Orleans.

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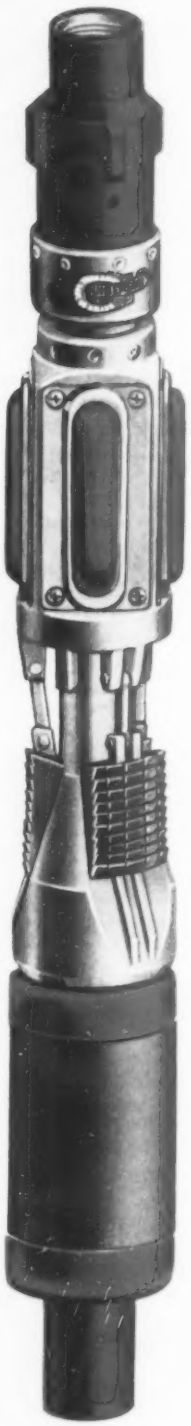

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to 19,800 ft. of 4½-in. drill pipe, and the manufacturer claims that the mast itself will withstand 100-m.p.h. winds, or 75-m.p.h. winds with all pipe racked. This is an important factor, since much of the offshore drilling contemplated will lie in areas susceptible to hurricanes.

Six sheaves on the crown block string 12 lines, and sheaves were grooved to take 1⅜-in. wire line. Platform capacity of the derrick is 11,880 ft. of 4½-in. pipe in fingers on the left side, plus 7,920 ft. in fingers on the right side. (Ocean Drilling has ordered 15,000 ft. of 5-in. drill pipe, according to Laborde).

The mast can be broken down into sections with maximum dimensions of 8 ft. high by 4 ft. wide by 30 ft. long, for galvanizing as protection against corrosion. Base of the derrick is 25 ft. square, and top tapers to 5 ft. by 6 ft. 1 in.

Power . . . Rig is fitted with an Emsco EDA steam-type draw works, electrically driven by 1,500-hp. d.c. motors. It can drill holes up to 20,000 ft. The power plant itself consists of two Fairbanks-Morse opposed-piston 38-D, 10-cylinder diesel engines, each rated 1,600-hp. at 720 r.p.m. Each engine will drive four d.c. generators (two 1,200-kw. and two 400-kw.) and either of the units, consisting of one engine and four generators, would be capable of operating the complete rig. Thus, there is a complete standby unit available.

Pumps . . . The rig is equipped with two Gardner-Denver GXR 7½ by 18-in. slush pumps, rated at 750 hp. each, and one FXQ 7¾ by 16-in. Gardner-Denver slush pump for mud mixing. The GXR pumps each will be driven by an 875-hp. electric motor directly coupled to the pump drive shaft, thus eliminating all sheaves, belts, chains, etc.

Selection of the mud pumps was carefully considered, according to Laborde, inasmuch as the equipment was installed in the bottom hull, and the pontoon "built around" it, as is a ship's engine-room construction. No one component could exceed a 10-ft. diameter, inasmuch as in event a failure, all repair parts and accessories would have to be installed by the crane through the elevator shaft.

The mud end of these pumps can be dismantled into two parts, either of which fit in the elevator, and therefore could be changed or replaced without having the barge go to dry dock.

The manufacturer, incidentally, has uprated the 750-hp. pumps by about 15 per cent, due to the 60-ft. positive head of mud on the suctions, as the pumps are located in the lower hull and the active mud pits are on the upper platform.

Submerging and raising . . . Submerging and raising operations will be controlled from a main control station which is located at the center of the barge, just beneath the platform deck. In this control station are the indicating instruments, communication equipment, and other devices for regulating these operations. (Two-way communication on the barge is essential in spotting the unit in the desired position.)

During submergence and raising, the barge will be kept in position by means of four anchors which will be streamed, one from each quarter of the barge, and regulated by winches. After the barge has reached bottom, anchors will be left streamed for possible emergency uses, which might require movement of the barge without benefit of tugs or other equipment.

Slot . . . The 26-ft. slot is relatively short compared to other drilling barges. The thought behind this arrangement is twofold: (1) The drilling operation with its inherent possibilities of blowout or other dangers is located as far as possible from the living quarters and from the machinery. It is therefore felt, Laborde said, that the machinery which is below water, could be operated in spite of a blowout and the barge could be pumped out and maneuvered by means of its anchors, to come off a well site, suffering only minimum damage in the vicinity of the derrick floor. (2) The slot provides a minimum interruption in the large base of the barge for maximum bottom-bearing area.

The slot is relatively wide to permit construction of protective or production platforms at least 25 ft. in width, and still allowing the barge to get on or off the well. The barge's 20-ton crane and air-operated pile-driver equipment could be used to build such platforms in the slot before the barge is moved from location.

To do this, it is contemplated that the cantilever-type mast would be laid down, and movable sections in the derrick floor and main platform be removed.

Safety below deck . . . In order to withstand the pressure heads involved (the lower hull was designed to a 60-ft.

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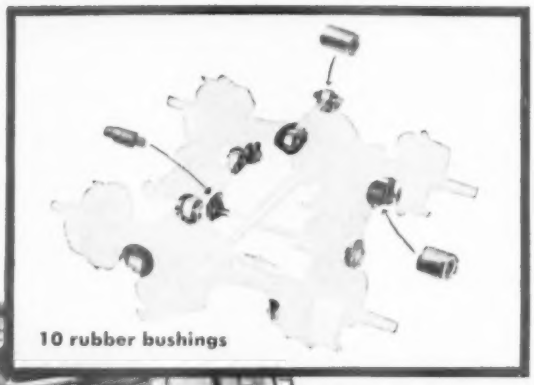

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water head) it was necessary to use ⅝-in. steel plate throughout the lower hull. For an additional safety factor, the engine-room spaces are surrounded by ballast tanks, and also have a double bottom and a double overhead.

Normal access to the engine room is provided by an electric elevator within one of the caissons. It is two-speed, with 5-ton capacity at 20 ft. per minute, and 2-ton capacity at 100 ft. per minute for personnel service.

Emergency access, or escape, can be accomplished by means of ladders in each of the ventilation trunks, as well as in the main piping trunk.

Engine exhaust is conducted up one of the caissons, and the engine-room air blowers, having a total capacity of 70,000 cu. ft. per minute, can move more air than will ever be necessary under normal conditions.

Modern quarters . . . On the top deck are modern quarters for the crew, which are completely air-conditioned, and can accommodate 40 men around the clock. Three independent 100-kw. diesel-engine-driven auxiliary generators will supply lighting, air-conditioning, and other incidental power service for the barge.

Owners . . . Ocean Drilling has headquarters in the Carondolet Building in New Orleans, and is owned by Murphy Corp. of El Dorado, Ark., Laborde, and a group of independent investors. A number of other oil companies participated in original planning and studies which led to formation of the company, but they did not choose to participate in final formation of the firm.

Laborde said that while the company will operate initially as a drilling contractor, it is anticipated that Ocean Drilling & Exploration Co. will become an independent operator in the offshore play.

THE RACE IS ON . . .

Why this barge is significant, what prompted its development, how it is going to be used, what it promises in offshore oil finding, and what other strange and ingenious mechanical monsters are being considered for offshore drilling are told in a companion story by Henry D. Ralph starting on page 92.

For another approach to this problem, see the Journal issue of January 18, with its special section on a six-well rig, designed to drill six wells without a move.

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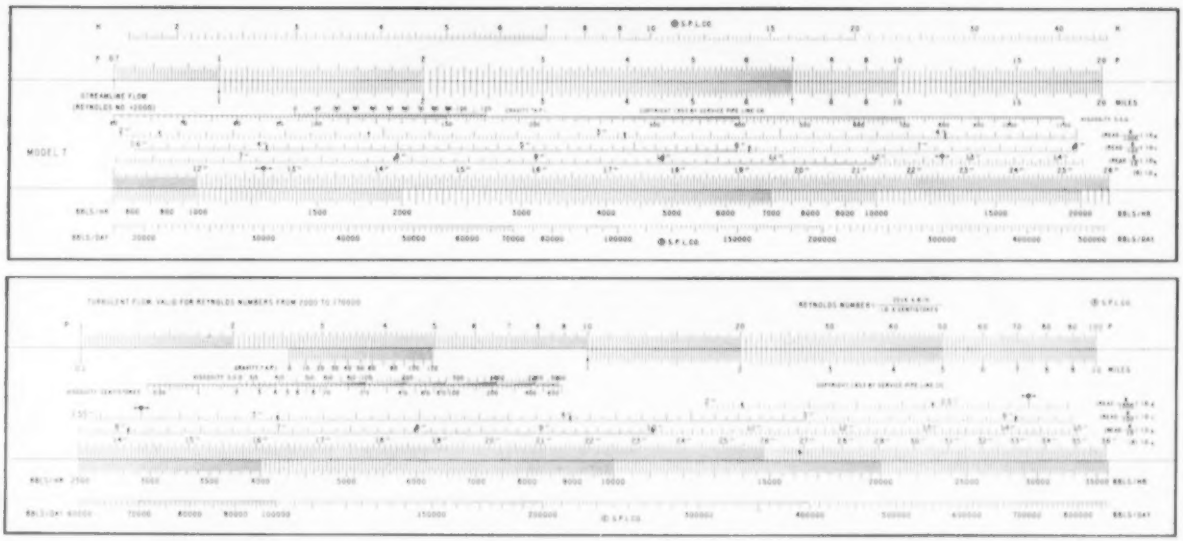


Fig. 1 Slide rule developed by Service Pipe Line Co. for the solution of fluid-flow problems. At top is rule for stream line flow; beneath it is rule for turbulent flow.

New Hydraulic Slide Rule Solves Problems

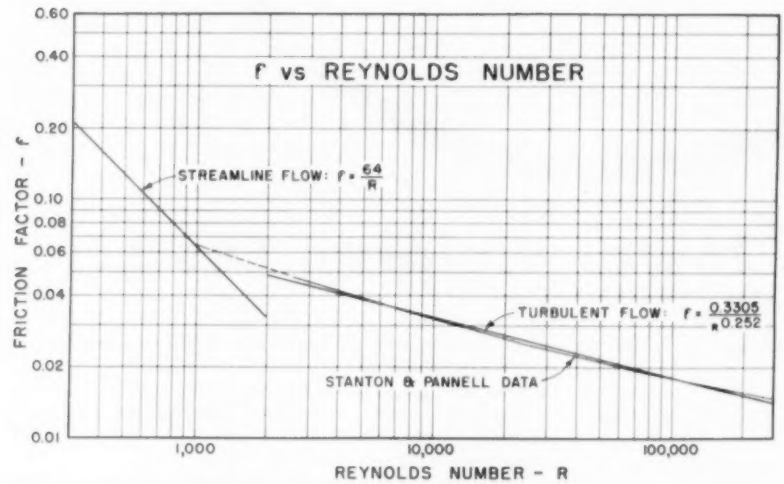


Fig. 2 Chart of friction factor versus Reynolds number for stream line and turbulent flow. For developing relationship between friction factor and Reynolds number, a straight line was drawn between points on the Stanton and Pannell curve, corresponding to Reynolds numbers of 6,000 to 130,000.

NOTE: In order that the slide rule here described may be available for the industry, arrangements have been made by Service Pipe Line Co. for its distribution through L. L. Ridgway Co., Inc. It will be manufactured in a convenient size with a case that makes it easy to carry. Orders for the rule should not be addressed to Service Pipe Line Co. but to L. L. Ridgway Co., Inc., 701 South Cincinnati, Tulsa, which will handle the exclusive sales. Instruction books will be included with the rule giving additional information of its development and use.

In Fluid Flow for Pipe Liners

by W. L. Kennedy, Jr.

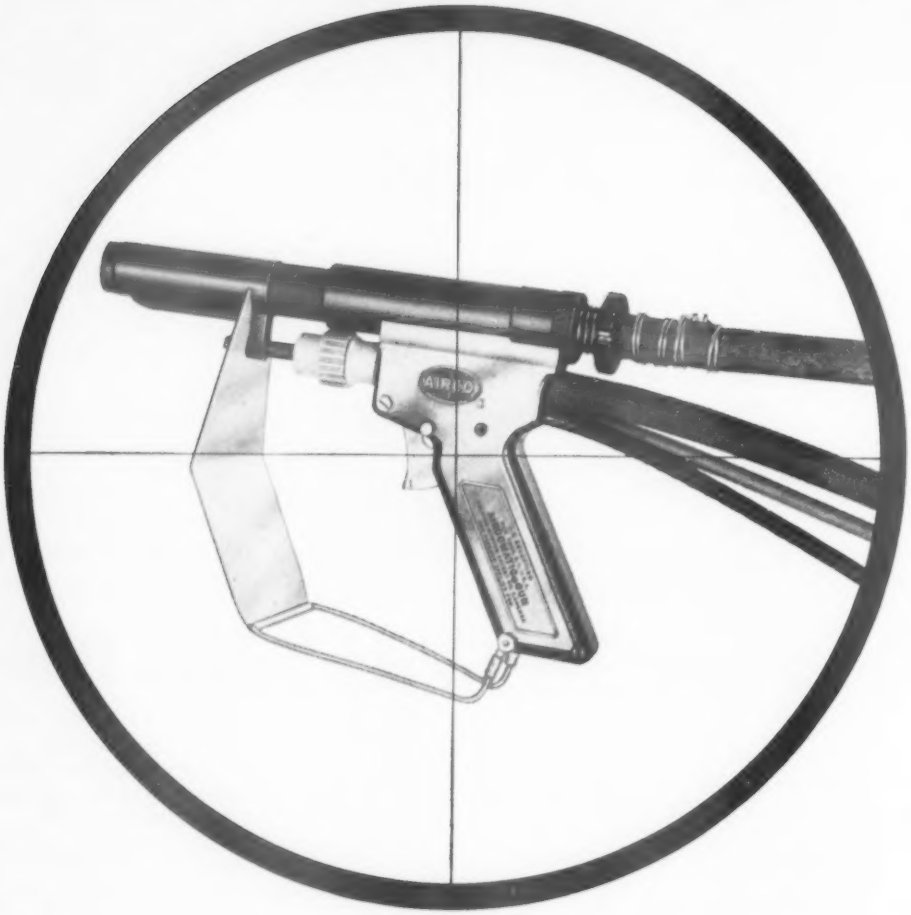
A SLIDE rule has been developed by Service Pipe Line Co. for the solution of fluid-flow problems involved in the design and operation of crude-oil pipe lines.

Author is senior engineer, Service Pipe Line Co., Tulsa.

Originally the rule was devised by T. R. Aude, now manager of planning and economics for Service Pipe Line Co., before it was copyrighted in 1943. Subsequently revision for a wide range of applications to include large-diameter lines was commenced in 1948 through the efforts of L. E. Anderson, engineer, Service Pipe Line Co. The outcome of the combined work of several Service Pipe Line men was the design of the present compact rule. It is as accurate as elaborate charts of the type that formerly covered an office wall.

Variable determination . . . Anyone of the five variable factors—flow rate, pressure, diameter, viscosity, and specific gravity—can be determined under conditions of either streamline or turbulent flow if the other four factors are known.

This rule is relied upon for the final solution of gathering-line and trunk-line problems. In no sense is it adapted only for preliminary estimates. The rule is as accurate as formulas and charts, and can be used to solve problems much



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The rule is valid for Reynolds numbers up to 170,000. It serves for computations of products lines within this range; however, its accuracy will decrease with Reynolds numbers beyond 170,000. The rule is sufficiently accurate for normal steel pipe. Compensation would, of course, need to be made for the effects of paraffin and unusual roughness of the pipe.

The rule has been designed so that one side can be used for the solution of turbulent-flow problems, and the other side can be used for solving problems involving streamline flow conditions.

Accuracy of the rule has not only been repeatedly checked with experience of Service Pipe Line Co., but also with the operating experience of Standard Oil Co. (Ind.) products lines. Furthermore, it has been verified by other companies operating large-diameter lines.

Basic equations . . . The series of equations on which the rule is based provide for the determination of any one factor under conditions of either streamline or turbulent flow where other factors are known such as flow, pressure, diameter, viscosity, and specific gravity. Feet of head can be converted to pressure in pounds per square inch by knowing the gravity. Furthermore, data for equivalent lengths of line of different diameters or multiple line systems can be determined.

In hydraulic calculations involving crude oil, it has been found that the basic formula as introduced by Darcy in 1857 is the most applicable of the various flow formulas. It is:

$$h_f = \frac{flv^2}{2gd}$$

In this form, the equation is solvable if the various quantities are expressed in foot-pound-second units, giving the value of h_f in feet. This equation converted to a more practical form, can be expressed as:

$$P = \frac{34.87\ fB^2s}{D^5} \qquad (1)$$

where:

P = pressure drop, psi. per mile
B = line throughput, bbl. per hour
s = specific gravity of oil pumped
D = internal diameter in inches
f = friction factor

Since it is impossible to physically measure friction factor, it must be determined experimentally and expressed as a function of Reynolds number, R.

Experimental work done by Stanton and Pannell on fluid flow through pipes for obtaining a relationship between friction factor and Reynolds number has been substantiated for pipe varying in diameter from 6 in. to 30 in. An expedient equation based on this curve has been developed for determining directly the trunk-line capacity.

The problem was to select a range and develop a relationship between f and R which would give fairly consistent results over the entire range of turbulent-flow conditions encountered in crude-oil pipe lines. To do this, a straight line was drawn between points on the Stanton and Pannell curve corresponding to R of 6,000 and 130,000. It can be seen from Fig. 2 that this straight line does not vary widely from the curve at any point.

The equation of this line is calculated to be:

$$f = \frac{0.3305}{R^{0.252}} \qquad (2)$$

but

$$R = \frac{2{,}214\ B}{D\nu}$$

(ν = kinematic viscosity in centistokes)

which substituted in Equation 2 gives:

$$f = \frac{0.0474\ D^{0.252}\ \nu^{0.252}}{B^{0.252}} \qquad (3)$$

This in turn is substituted in Equation 1 and the resultant form is:

$$P = \frac{1.653\ B^{1.748}\ \nu^{0.252}\ s}{D^{4.748}} \qquad (4)$$

Solving this equation for B gives the following:

$$B = \frac{0.750\ P^{0.572}\ D^{2.716}}{\nu^{0.144}\ s^{0.572}} \qquad (5)$$

This last formula is the basis used for the turbulent-flow side of the hydraulic slide rule. The upper limit for this formula has been set at 170,000, since the straight-line relationship between f and R does not vary widely from the Stanton and Pannell curve up to this Reynolds number.

Smaller lines . . . For lines smaller than 6 in., higher friction factors for corresponding Reynolds numbers were used in the development of the rule. This was because the friction factor obtained from commercial steel pipe was in nearly every case higher than the Stanton and Pannell data. A great deal of variation was obtained by different experimenters. However, all tests showed a higher friction factor for the same Reynolds number, as the diameter decreased.

For pipe smaller than 6-in. diameter, friction factors are 3½ per cent greater for 5-in. diameter and as much as 16 per cent greater for 2-in. diameter than for corresponding Reynolds numbers of pipe 6-in. diameter and larger.

The basic relationship between f and R has been established for streamline flow and verified by many experimenters, and will be valid for crude-oil pipe lines. This relationship can be expressed by the equation $f = 64/R$, which, when substituted in Equation 1, gives:

$$B = \frac{PD^4}{1.008\ \nu\ s}$$

This is the equation used in the design of the streamline-flow side of the hydraulic slide rule.

The hydraulic slide rule scales are explained below and shown as Fig. 1.

Scale H is graduated in feet and represents elevation or head.

Scale P is graduated in pounds per square inch and may be used to represent friction loss in psi. per mile, or total effective pressure.

Scale Miles is graduated in miles and represents pumping distance.

Scale Gravity, °A.P.I. and Viscosity, S.S.U. are used to correct for the gravity and viscosity of the crude oil being pumped.

Scales $I.D._a$, $I.D._b$, $I.D._c$, and $I.D._d$ represent the actual inside diameter of the pipe in inches. The small arrows (↓) near the figures 2 in., 2½ in., 3 in., 4 in., 6 in., 8 in., and 10 in. indicate the inside diameter of standard-weight pipe of those nominal sizes.

Scale Bbls./Hr. gives the pumping rate in barrels (42 gal.) per hour.

Scale Bbls./Day gives the pumping rate in barrels (42 gal.) per 24-hour day.

Scale Viscosity, Centistokes provides for converting S.s.U. to centistokes when desired and for solving flow problems involving crude oils with viscosities less than 33 S.s.U.

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Anderson, Lowell E., Crude-Oil Flow Characteristics Experienced in Large-Diameter Lines, The Oil and Gas Journal, December 8, 1949.

Lyons Sandstone

RECENT development of oil reservoirs productive from the Lyons sandstone of Permian age in the Denver-Julesburg basin draws renewed interest in the stratigraphy and sedimentation of that objective.

The Lyons contains an intricate relationship and interfingering of continental deposits, beach sands, littoral silts and mud, and evaporites which were deposited simultaneously. In the center of the basin, extensive evaporitic deposits were formed during Permian time, consisting of almost pure salt and thin beds of anhydrite. These evaporites interfinger with the red, silty, littoral, and deltaic sediments on the margins of the basin. (See Fig. 1.).

Permian System

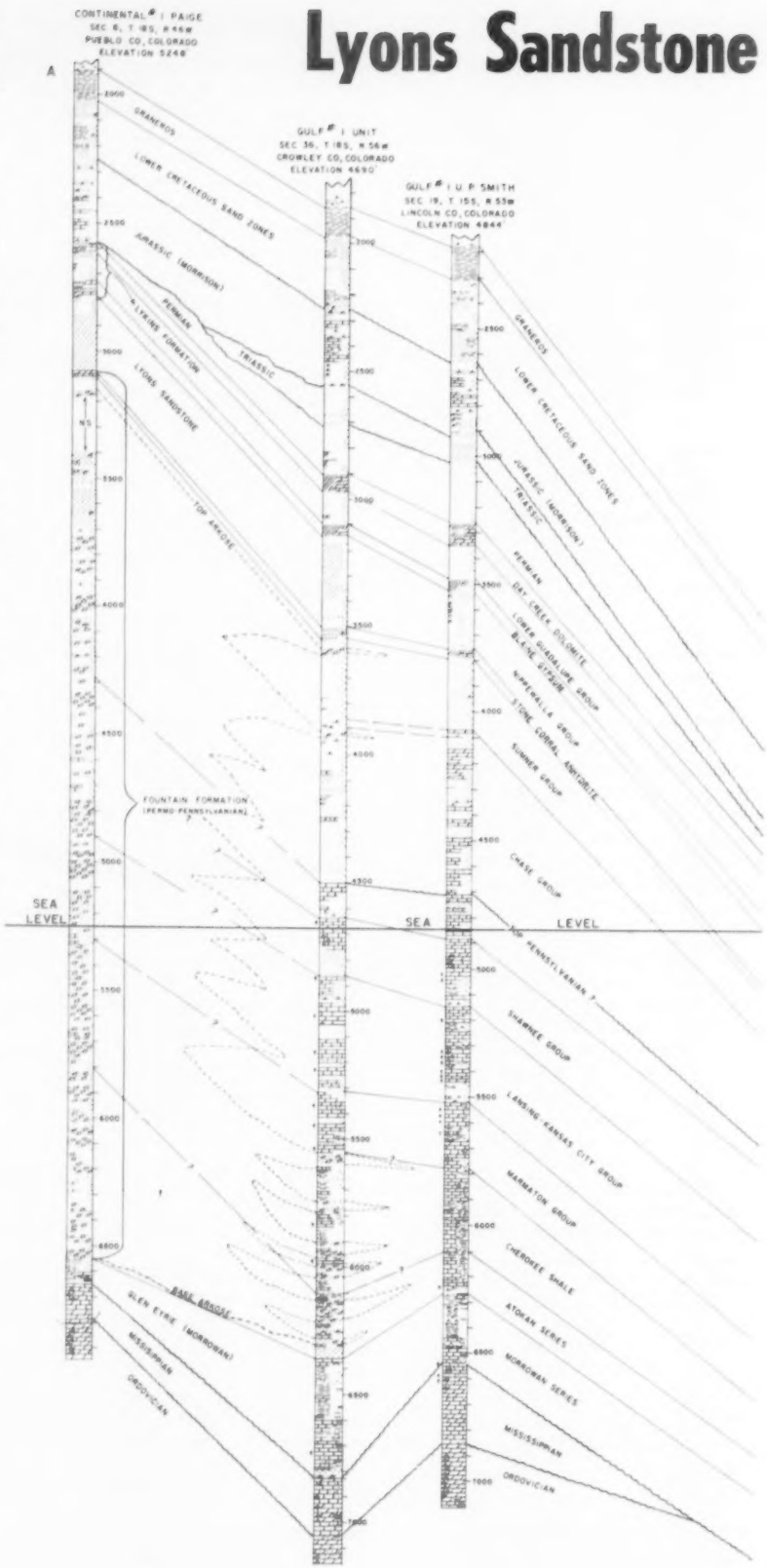
A study of the tectonic map of the Permian drawn by Eardley shows that the entire Denver-Julesburg basin was a shelf area of sedimentation receiving less than 1,000 ft. of sediments. He also suggests that the ancestral Rockies were emergent and furnished sediments to the surrounding stable areas.

A detailed study of Wolfcamp and Leonard sediments suggests local minor adjustments with reference to sea level of the Las Animas arch, Chadron arch, Black Hills and Hartville uplift, to produce small enclosed evaporite basins. This could have occurred in either of two ways: (1) The above-mentioned positive areas may have experienced minor upwarp; or (2) these features may have existed in the Permian seas as shallows or shoals.

Minor retreat of the sea due to climatic conditions or other causes would then produce local enclosed evaporitic basins. The complex facies relationships associated with these local basins have confused early studies of sedimentation within the Denver-Julesburg basin.

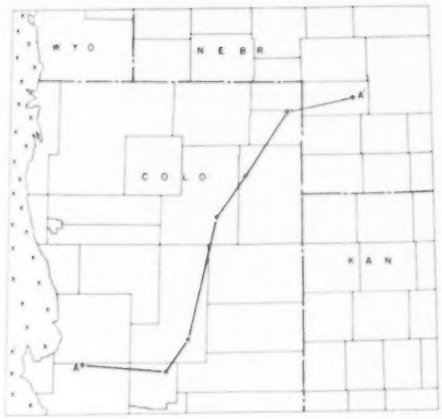
Wolfcampian series . . . With the present control and knowledge of the Denver-Julesburg basin it is impossible to recognize individual beds of the Kansas section or even define the limits of the Chase, Council Grove, or Admire groups. However, the general features of these groups can be carried into Colorado and western Nebraska from Kansas and Central Nebraska.

In the southern and eastern part of the basin, sediments assignable to the Wolfcamp range from 300 to 400 ft. in thickness. Westward, and in the southern portion of the basin, the section changes to a more clastic facies and increases in thickness to 650 ft. in Gulf Oil Corp. 1 U. P. Smith, in 19-15s-53w, Lincoln County, Colorado. From this well westward it is impossible to recognize Wolfcamp sediments, due to their interfingering with coarse clastics of upper Fountain type.



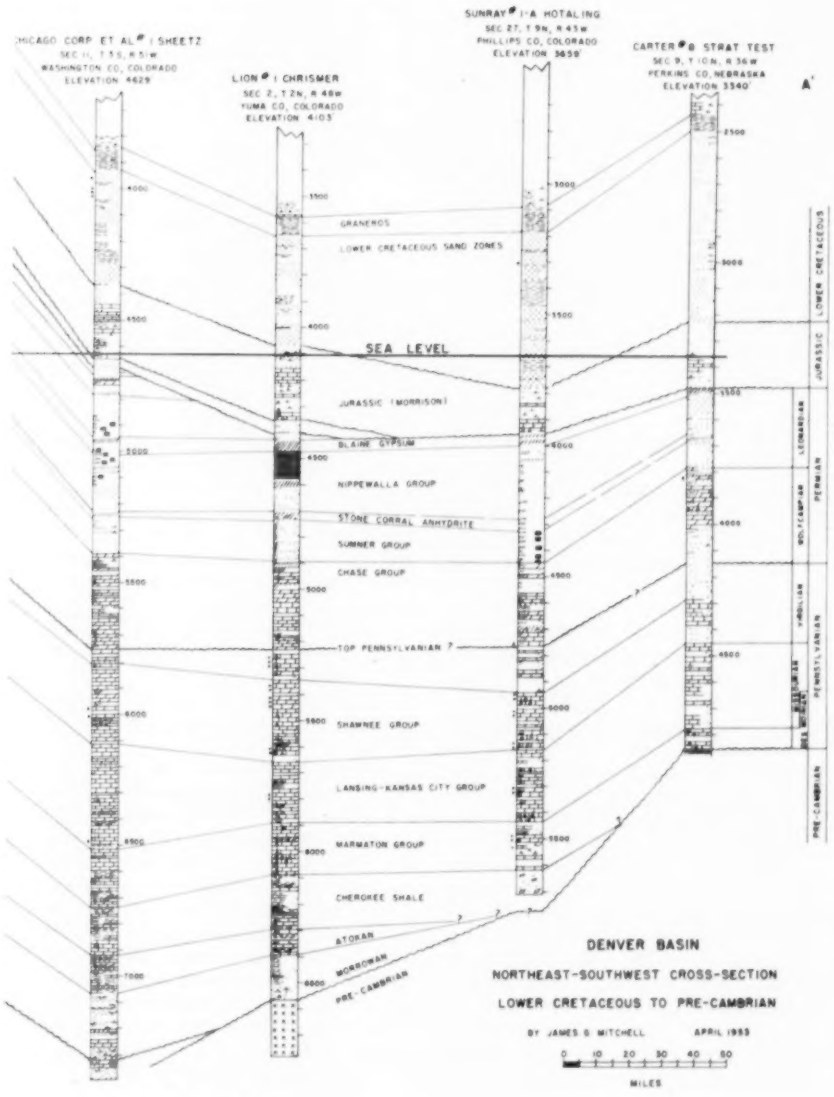
GEOLOGIC CROSS-SECTION of the Denver-Julesburg basin drawn from the Front Range along a southwest-northeast direction to southwestern Nebraska. (Fig. 1.)

. . . A New Objective in Eastern Colorado



Stratigrapher discusses Permian evaporites occurring in center of the Denver-Julesburg basin, which interfinger with red, silty, littoral, deltaic sediments on basin margins containing the Lyons sandstone.

by James G. Mitchell



In the central portion of the basin, Shell Oil Co. A-16 Green in 30-9n-53w, Logan County, Colorado, has 475 ft. of anhydrite, evaporitic limestone, and evaporitic dolomites interbedded with minor amounts of red shale and siltstones, which are assigned to the Wolfcamp. This same series of beds can be traced northward, with no appreciable change in thickness.

Greatest thickness of Wolfcamp beds is found in Sioux County, Nebraska. In the Continental Oil Co. 1 John D. Wear, 10-29n-57w, Sioux County, Nebraska, Wolfcamp beds, largely of evaporitic origin, attain a thickness of 875 ft. at this location. A noticeable increase in red shale is apparent in the upper two-thirds of the section, but only a slight increase of sands and silts.

Northward from this thick section of Wolfcamp evaporites, a more normal thickness is found in the seaway connecting the Denver - Julesburg basin with the southeast end of the Powder River basin of Wyoming between the Black Hills and the Hartville uplifts. In Amerada Petroleum Corp. 1 Ostermeyer 10-32n-52w, Dawes County, Nebraska, 460 ft. is assigned to this age. In the Pacific Western test in 10-11s-1e, Fall River County, South Dakota, it is 635 ft. thick. In Lion Oil Co. 1 Hanson Government, 10-35n-63w, Niobrara County, Wyoming, 550 ft. is assigned to the Wolfcamp.

The best criterion for recognition of the contact of Permian and Pennsylvanian is the last appearance of evaporatic sediments. The dolomites of the lower Permian are earthy, fine-textured evaporitic types, and have inclusions of anhydrite and fine crystals of anhydrite and gypsum in the dolomitic matrix. Dolomites of the Upper Pennsylvanian are sucrose, secondary types; if evaporites are present, they are secondary and restricted to fracture systems in these carbonates.

Leonardian series . . . As pointed out in the discussion of Wolfcamp sedimentation, minor facies changes were noted, but it was found relatively easy to follow the broad aspects of this period throughout the basin. In Leonard time, a far more complex set of conditions existed which gave rise to

profound differences in sediments that are equivalent to each other in time of deposition.

With advent of Leonard deposition, a blanket deposit, the Sumner group, was laid down. This is a group of sediments which is very uniform in character throughout the entire basin area. This group consists of red silty shales, red siltstones, and lentils of shaly sand, with a stray unnamed anhydrite bed locally developed in the southeastern part of the basin. The series is capped by an anhydrite, dolomitic anhydrite, or dolomite herein designated as the Stone Corral anhydrite. A few local occurrences of red salt clastic shale and red shale with anhydrite inclusion are noted in various places.

Sumner group is made up of Ninnescah and Stone Corral members at the type section. These beds correlate variously with those at the outcrop along the Front range in Colorado and Wyoming, with the Cassa group (Condra, Reed, and Scherer), the Owl Canyon formation (Condra, Reed, and Scherer), and the lower Satanka (Darton).

Stone Corral anhydrite can be traced clearly into Colorado. It is a persistent and well-developed bed throughout the Colorado portion of the basin and can be traced into the Nebraska Panhandle as far as Sohio 1 Dove, 1-21n-49w, Morrill County, Nebraska. Stone Corral loses its identity north and west beyond this point.

The series of sediments overlying the Sumner group, the Nippewalla group, Blaine gypsum, Lower Guadalupe group, Day Creek, and upper Permian, were deposited in such a shallow sea that changes in sea level due to evaporation exerted a broad influence on marine deposition and produced profound facies changes throughout the Denver-Julesburg basin.

A shallow, kidney-shaped basin existed in middle and upper Leonard time (from top Stone Corral upward), in which nearly pure salt, interbedded with anhydrite and evaporitic dolomite, was deposited. The most extensive and widespread development of pure salt occurred in the interval between the Blaine gypsum and the underlying Sumner group. In the northern and western portions of the Nebraska Panhandle, salt deposition continued through most of upper Permian time.

Salt basin . . . The area that received salt deposits represents the deepest part of the depositional basin, in middle and upper Leonard time. The geographical position of the basin is many miles northeast of the ancestral Rocky Mountains. The salt basin is known to exist in Yuma County, Washington, and Logan County, Colorado, with no well control to outline its western limit. In Nebraska the basin is known in western Cheyenne County, Morrill, Box Butte, Dawes, Sioux, Banner, and probably in Scotts Bluff and eastern Kimball County. Thick sections of salt are also known from eastern and northeastern Goshen County in Wyoming. It is reported that no salt is present in Sherrod & Apperson, 8 Gillette in 9-9n-61w, Weld County, Colorado, and that the producing sandstone (Lyons) occupies the position of the salt section between the Blaine gypsum and the top of the Sumner group in the Shell A-16 Green. The Gillette test is approximately 40 miles due west of A-16.

Position of the Lyons sand underlies the lower Lykins formation (which correlates with the Blaine gypsum basinward), and overlies a dolomite zone, which correlates with the Stone Corral basinward. Thus Lyons sandstone occupies the same position as the Nippewalla group.

East of the Paige well, the Gulf Unit well penetrates a correlative section very similar in lithology and thickness, but with minor amounts of red shale and red siltstone. Gulf 1 U. P. Smith, shows minor thinning of interval and the appearance of some evaporite in the form of anhydrite inclusions in the silty shales. Then, in the Chicago Corp. et al 1 Sheetz, salt and anhydrite (with a thin sand at the base), occupy this interval. In Lion Oil Co. 1 Chrismer, a thick, nearly pure salt, 130 ft. thick, occurs at the top, followed by 30 ft. of anhydrite, which rests upon 90 ft. of sandy and silty red shale.

From this point eastward the evaporites diminish in volume. In Sunray 1-A Hotaling, this interval is represented by dominantly red, slightly silty shale with thin beds of anhydrite and anyhydrite inclusions in the shale. A dominant sandstone, with only a trace of evaporites occurs in this interval. A noticeable shortening of section is equivalent to the Cedar Hills-Salt Plains-Harper members of the Nippewalla group of Kansas.

Source of the Lyons sandstone was the ancestral Rocky Mountains, a low-relief positive area to the southwest of the Denver-Julesburg basin. However, sandstones of the Cedar Hills and Harper members of Nippewalla group came from an eastern source.

Lyons sandstone . . . On the flanks of the basin, continental deposits of red muds, silts, and sands worked their way basinward on a gently sloping plain. Near sea level these continental deposits were reworked by wind and waves to be deposited as clean, highly cross-bedded beach deposits — Lyons sandstone. Basinward from the extensive beach sand deposits, fine muds and silts, which had been removed from these sands by wind, waves, and currents, were deposited as deltas and littoral sediments.

This facies is represented in the outcrop along the Front range as red, silty shales and shaly lenticular sands of the Satanka formation of Darton and the Upper Owl Canyon formation of Condra, Reed, and Scherer; however, on the east side of the basin they are equivalent to Cedar Hills-Salt Plains and Harper members of the Nippewalla group. Condra and Reed recognized this relationship as early as 1943.

Beach origin . . . A very thorough study and discussion of the origin and relations with adjacent sediments of the Lyons sandstone has been published by Warren O. Thompson. Thompson points out the following features as criteria for recognition of a beach origin, modified in part by continental deposition and eolian influence: (1) lamination and cross-lamination; (2) cross-stratification; (3) diastemic omission and overlap; (4) overlapping scoop-like embayments; (5) buried channels; (6) swash marks; (7) rhomboid ripple marks; (8) bubble impressions; (9) dendritic figures and kelp marks; (10) animal tracks. In summarizing this evidence, Thompson says:

"Minor original structures like swash mark and backwash marks are not easily misinterpreted. Their presence in the Lyons sandstone is a strong argument in favor of a shore-process hypothesis of origin.

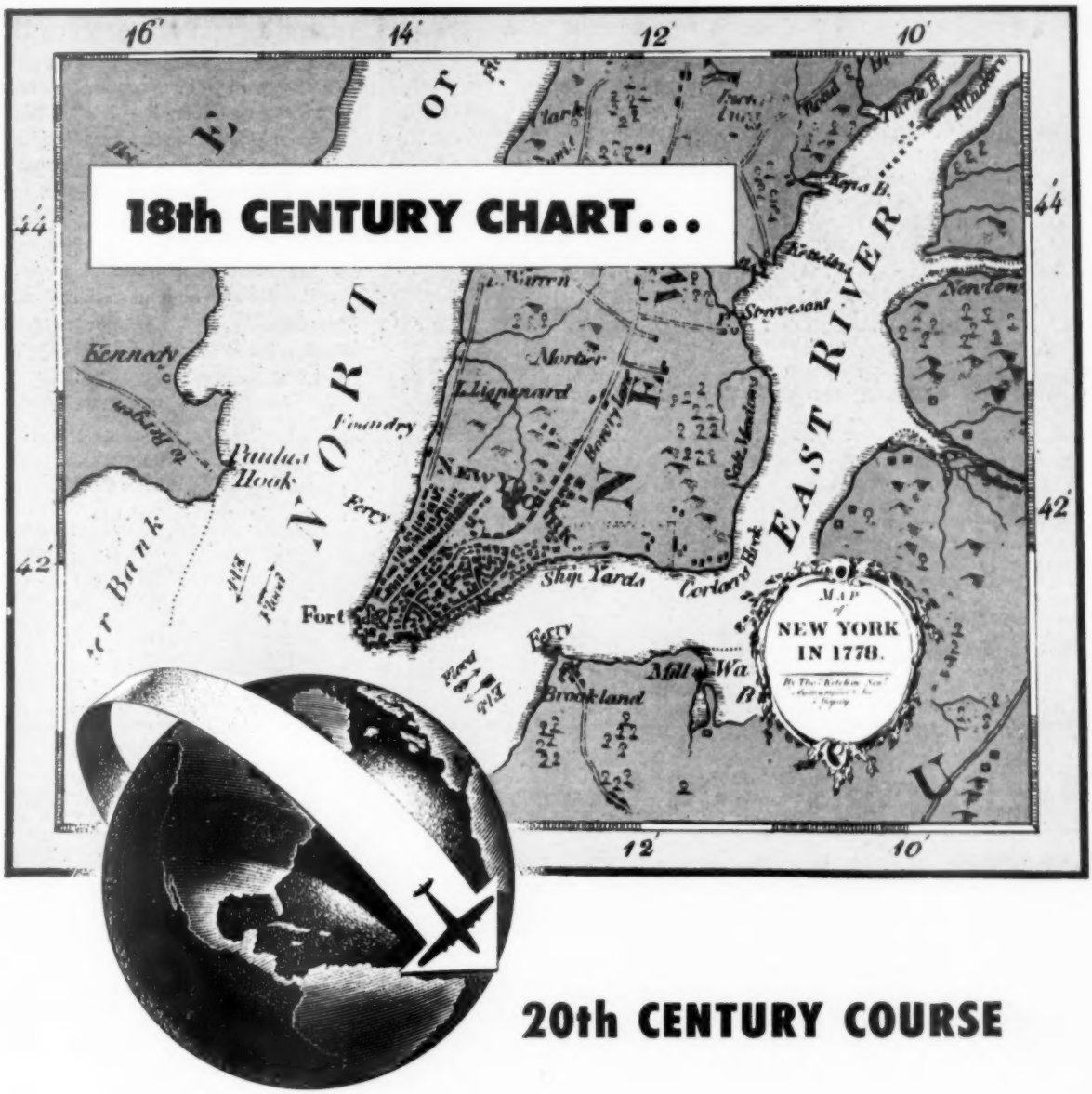
"From these several physical features of the Lyons sandstone comes the conviction that shore processes have played a very important part in deposition; not, however, to the exclusion of the wind as an important secondary agent. This is natural, as can be verified by the examination of any recent shore. Almost invariably, present-day beaches are involved with dunes; hence, there is no reason to suppose that Permian beaches were not similarly involved.

(Continued on page 136)

THE AUTHOR

MITCHELL

James G. Mitchell, Denver, is acting president of Canadian Stratigraphic Service, Ltd., Calgary, Alt., and Central Canadian Stratigraphic Service, Ltd., Regina, Sask. He is a native of Shelbyville, Mo. He graduated from University of Missouri in 1932. Following 3 years of graduate work, Mitchell joined Pure Oil Co. as a stratigrapher and worked in Oklahoma, Illinois, and the Rocky Mountains. In 1949 he became coowner of Denver Sample Log Co. and established the Canadian branch of that organization.



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The Bank was founded by a group of New York's leading merchants in 1784. Business concerns and individuals continue to find here a quick understanding of their needs. Among our services are specialized Trust and Investment Counsel Departments. All our complete and up-to-date facilities are at your disposal.

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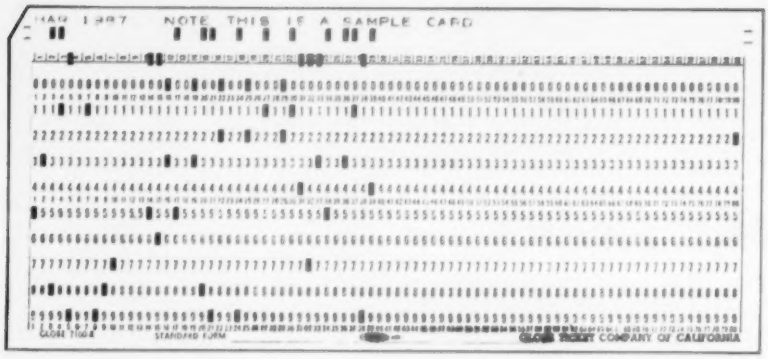


Punch-Card Operations Speed Up

by Charles Kendrick

This is another in a continuing series of articles describing how modern high-speed business machines are speeding operations in the petroleum industry. Previous articles include a special section, "Oil's New Engineering Robots: 1953's High-Speed Business Machines," in the February 2, 1953, issue, with eight articles on oil-industry punch-card operations, and "Use Punch-Card Equipment to Speed Your Oil Exploration," in the issue of July 6, 1953.

LEASE NO	COUNTY	LEASE DATE	YEAR EXP	GROSS ACRES	NET ACRES	LEASE BONUS	ANNUAL RENTAL
PER 221	PERKINS	1-18-51	1-18-61	160.00	160.00	16.00	16.00
PER 222	PERKINS	1-02-51	1-02-61	160.00	160.00	16.00	16.00
PER 223	PERKINS	1-02-51	1-02-61	160.00	160.00	16.00	16.00
PER 224	PERKINS	1-20-51	1-20-61	160.00	160.00	16.00	16.00
PER 225	PERKINS	1-22-51	1-22-61	80.00	80.00	8.00	8.00
PER 227	PERKINS	1-22-51	1-22-61	40.00	40.00	4.00	4.00
PER 228	PERKINS	1-22-51	1-22-61	40.00	40.00	4.00	4.00
PER 229	PERKINS	1-23-51	1-23-61	216.80	216.80	21.68	21.68
PER 230	PERKINS	1-24-51	1-24-61	240.00	240.00	24.00	24.00
PER 231	PERKINS	1-24-51	1-24-61	200.00	200.00	20.00	20.00
PER 232	PERKINS	1-23-51	1-23-61	159.42	159.42	15.94	15.94

Handling of 13,000 Lease Records for Los Nietos

THE PROBLEM . . . With the advent of the Williston basin as a new oil frontier, Union Oil Co. of California and its wholly owned subsidiary, Los Nietos Co., began acquiring oil and gas leases until in 1951 the company was servicing some 13,000 leases covering over 4,000,000 acres.

The leases used in the Williston basin are mostly of the "unless" type, which means that the company must tender the lease rental to the lessor or his depository bank on or before the due date or the lease automatically expires. With the volume of leases which were being serviced manually, many complications resulted from the large number of leases having rentals coming due in the summer months, and also, from the many mineral deeds which were being bought and sold under these leases.

Obtaining statistical information relating to the leases also became a rather burdensome problem, even though a microfilm system was used to compile cost and acreage reports. This system necessitated taking personnel away from their regular duties to work on these reports.

Our objective then was to institute a system which could automatically compute and write our many lease rental checks as well as quickly and accurately compile statistical information.

The author is supervisor of lease processing for Union Oil Co. of California, at Bismarck, N. D.

THE SOLUTION . . . After a study of the systems used by several oil companies having problems similar to the above, it was decided to use a combination Remington Rand Kardex filing system coupled with an I.B.M. punch-card operation.

We then contacted our own I.B.M. accounting division at our head office in Los Angeles and basically devised the system which we intended to use. However, their facilities were being operated at full capacity and they were unable to undertake a project of this type for several months. We then contacted Commercial Business Service of Long Beach, Calif., a privately owned I.B.M. service bureau, which had been doing some excellent work for other oil companies in California.

Commercial Business Service had its representatives study our proposed system, and after suggesting several refinements in procedure, we were ready to begin making the change to a mechanical system of operation. In the spring of 1953, Commercial Business Service, using our lease digest reports, began punching on I.B.M. tabulating cards the pertinent information relating to the leases.

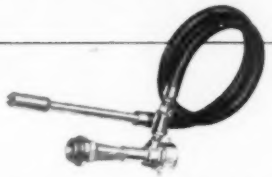
Details of New System

Periodically, as the cards were punched, they were run through the I.B.M. tabulator and a register was printed. This register was proof-read against our original lease records and errors and corrections were noted. After a second proofreading, the information was ready to be printed on our lease-rental cards, a 5 by 8 form which had been designed so that it could be easily printed by the I.B.M. tabulator. This form contains all pertinent information needed to write lease rental checks and compile statistical information.

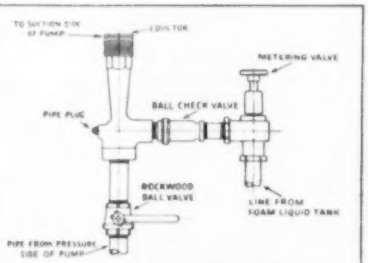
Two lease-rental cards are used for each lease—one buff and one white. These cards are identical in form; however, the buff is filed in a Remington Rand Kardex file, in chronological due date order, by area. The white card is filed, by area, in lease-number sequence. The functions of these cards will be explained later.

The I.B.M. Model 407 type tabulator was used in setting up the new system.

This Rockwood equipment puts Rockwood FOAM to work for you —



Foam Eductor introduces Rockwood FOAM into hose lines for use with Rockwood type FFF FogFOAM Nozzles. Connects discharge gate of fire trucks to hose line — hydrant to hose line — or one length of hose to another. In 1½" and 2½" sizes. Operates from 75 to 175 p.s.i. at Eductor inlet. Approved by Underwriters' Laboratories, Inc.



Around-the-Pump Proportioner Model Dual "B" automatically feeds FOAM into hose lines, assures accurate mixing. Used when pressure is maintained at pump. Operates in range from ¾" booster lines to 2½" hose lines. Maximum discharge 400 g.p.m. Custom engineered proportioning systems for fire trucks, crash trucks, etc. also available. Write for details.

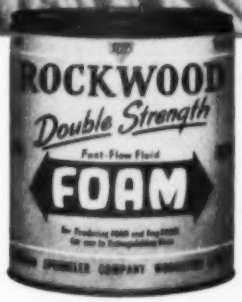
Type SG-60 FogFOAM Nozzle with FF extension features FogFOAM and solid FOAM stream discharge. Performance for FogFOAM — 450 g.p.m. at 100 p.s.i. — for solid FOAM stream 500 g.p.m. at 100 p.s.i. Approved by Underwriters' Laboratories, Inc.

Type FFF FogFOAM Nozzle with FogFOAM screen discharges wide pattern of FogFOAM. Also available with shaper to discharge long solid FOAM stream. For 1½", 2½" and 3½" hose lines. 2½" size discharges 200 g.p.m. at 100 p.s.i. Approved by Underwriters' Laboratories, Inc.

The Evening Bulletin, Philadelphia

Gasoline Fires Quenched Quicker

Put fire-fighting punch into ordinary water! Three parts of Rockwood Double-Strength Fast-Flow Fluid FOAM mixed with 97 parts water produces the flame-smothering FOAM blanket above. Spreads rapidly even at sub-zero temperatures. Seals off combustible vapors, flows freely around construction. Quickly re-seals if broken. A boon to fire-fighters!



APPROVED BY UNDERWRITERS' LABORATORIES, INC.
Comes in 5 gallon cans or 50-gallon drums.

Standard Straight Foam Play Pipe and FOAM Pick-Up Tube discharge FOAM from 1½" hose line. Discharges 60 g.p.m. at 100 p.s.i. Range: approximately 55 feet. Approved by Underwriters' Laboratories, Inc. and FML.

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Company .....
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City .....
Zone ..... State .....

ROCKWOOD SPRINKLER COMPANY

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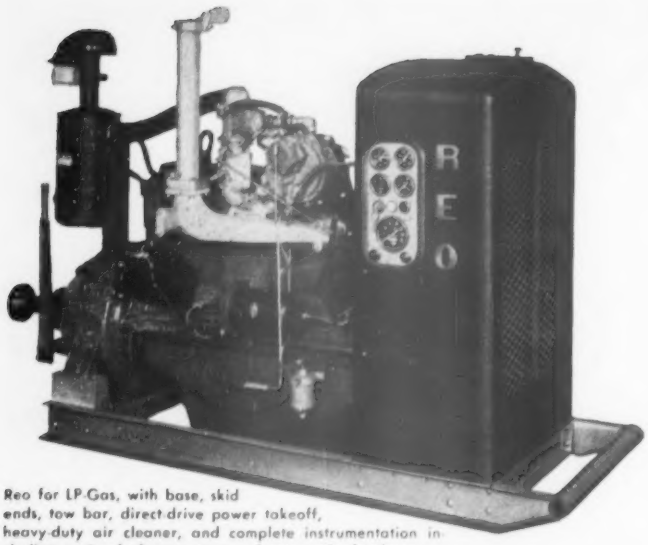

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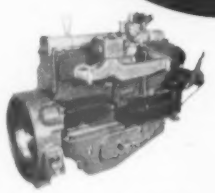
Reo Industrial Power Units are *factory-built* to operate on gasoline, natural gas, liquefied petroleum gas, or in dual-fuel combinations. For every service or service requirement from 50 to 180 continuous horsepower, you can look to Reo for the experience and quality that mean *outstanding* engine performance. Parts and service coast-to-coast. Write for specifications and the name of nearest dealer.



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Reo with base, full hood, and side panels. Either right-hand or left-hand rotation is available.

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INDUSTRIAL & MARINE ENGINE DIVISION

REO MOTORS, INC., Lansing 20, Michigan

The type characteristics of this tabulator are almost identical to the capital letters on a standard pica typewriter. The spacing is also the same both vertically and horizontally. The 407 tabulator has the advantage of being able to print certain punctuation marks which could not be done on earlier model tabulators. It has a computing and listing capacity of approximately 9,000 tabulating cards per hour.

On the average, about 10 tabulating cards per lease are used. Lease information is punched in cards as follows:

1. A separate tabulating card for each payee listing name and address.
2. A card listing the county, state, and geological area.
3. Brief legal description showing section, township, and range.
4. The depository and address.
5. One or more tabulating cards for remarks. All special instructions are written out and no codes are used.
6. A tabulating card listing the lease date, term, gross and net acres, the bonus, and annual rental.

Using several tabulating cards for each lease has many advantages. As land ownership is transferred, only one card must be changed. In writing lease rental checks, there is no need to use the card listing the lease description. Conversely, in writing statistical reports, there is usually no reason to use the payee or depository cards. All tabulating cards are kept by Commercial Business Service in its Long Beach offices.

Inasmuch as we have several thousand payees under our leases, it is necessary for us to keep an alphabetical list of these names in order that we can promptly answer inquiries from lessors who fail to include a lease number or a description in their letters. Formerly, this information was kept in loose-leaf notebooks, which was undesirable and burdensome. We now have a separate tabulating card for each payee which is filed alphabetically in a file kept in the lease-rental department. These cards have been run through the I.B.M. interpreter and the payee's name and lease number are printed on the top margin. This system allows us to quickly find any lease by name only.

As mentioned earlier, two lease-rental cards are used for each lease. The buff lease-rental card is filed in chronological due date order, by areas, in standard Remington Rand visible margin Kardex files. The card is so designed that the rental-due date, year of expiration, lease number, area, gross and net acres, and amount of annual rental are shown on the visible margin. Colored sliding Graph-A-Matic signals are used to indicate that the rental payment has been made. The signal is slid back into normal position when the canceled check has been received. Other colored signals are used to indicate special cases such as leases which require special billing or where a legal problem is involved. The rental checks are verified against this card and the check number and the initials of the person doing the posting are inserted in the designated space.

The white lease-rental card, which is an exact duplicate of the buff lease-rental card, is filed vertically, by area, in lease-number sequence. The primary purpose of this card is to notify our I.B.M. service bureau of the changes which occur due to changes of ownership, assignments, quitclaims, etc. The changes or corrections are noted on this white card in red pencil and are then forwarded to Commercial Business Service. The required changes are then made in their tabulating cards and new buff and white lease rental cards are printed by the tabulator and then returned to the lease-rental department.

LOS NIETOS COMPANY — WILLISTON BASIN DIVISION — LEASE RENTAL CARD

LEASE NAME — LEASE NO.
COUNTY — STATE — AREA
BRIEF LEGAL DESCRIPTION
DEPOSITARY ADDRESS
PAYEE AND ADDRESS — NET ACRES — AMOUNT
REMARKS
DATE OF LEASE — DATE FIRST RENTAL $ — MISC. COST $ — SEE ABOVE CARD
OPT. EXP. DATE — RENTAL PERIOD-MOS. $ — LEASE BONUS $ — USE SUB. TO MINERAL INT.
LEASE EXP. DATE — RATE PER NET ACRE $ — COMMISSION $
OUR % INT. IN LSE — RENTAL EACH PERIOD $ — TOTAL COST $ — FORM APPROVED
RECORD OF RENTAL PAYMENT
YEAR
CHECK NO.
RENTAL DUE DATE | YEAR EXP. | LEASE NO. | AREA | GROSS ACRES | ACRES IN LEASE NET ACRES | ANNUAL RENTAL

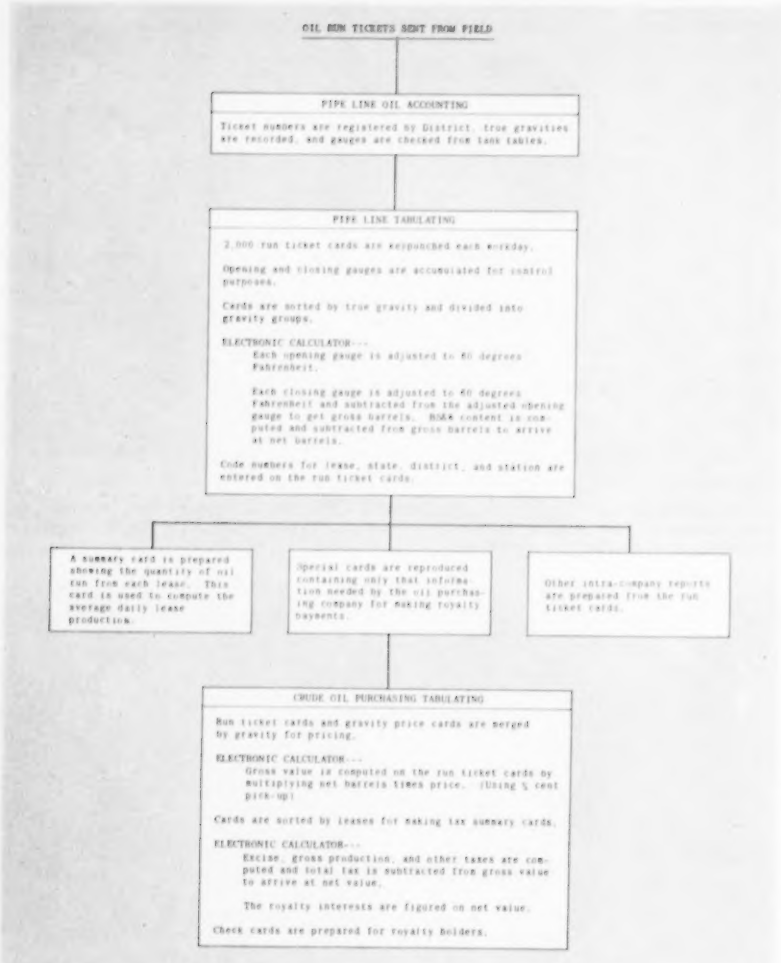
LEASE-RENTAL CARD which is filed vertically, by area, in lease-number sequence. Primary purpose of card is to notify service bureau of changes which occur due to changes of ownership, assignments, quitclaims, etc.

THE AUTHOR AND HIS STAFF in the lease-rental department: Mary Senzek, front desk; Hertha Giese, second desk; Charles Kendrick (author), supervisor of lease processing, rear desk; James Kearns, standing; Kay Huebschwerlen, at file, rear; Eva Dockter, at file, front.

Exploration Manager Approves

Each month the lease-rental department prepares an Obligation Report which is printed on the I.B.M. tabulator. This report lists the leases for which rentals will become due 3 months in the future. These leases are listed by areas in lease number sequence showing the rental due date, year of expiration, county, brief legal description, gross and net acres, and annual lease rental, followed by a remarks

(Continued on page 116)


OIL RUN TICKETS SENT FROM FIELD
PIPE LINE OIL ACCOUNTING
Ticket numbers are registered by District, true gravities are recorded, and gauges are checked from tank tables.
PIPE LINE TABULATING
2,000 run ticket cards are keypunched each workday.
Opening and closing gauges are accumulated for control purposes.
Cards are sorted by true gravity and divided into gravity groups.
ELECTRONIC CALCULATOR---
Each opening gauge is adjusted to 60 degrees Fahrenheit.
Each closing gauge is adjusted to 60 degrees Fahrenheit and subtracted from the adjusted opening gauge to get gross barrels. BS&W content is computed and subtracted from gross barrels to arrive at net barrels.
Code numbers for lease, state, district, and station are entered on the run ticket cards.
A summary card is prepared showing the quantity of oil run from each lease. This card is used to compute the average daily lease production.
Special cards are reproduced containing only that information needed by the oil purchasing company for making royalty payments.
Other intra-company reports are prepared from the run ticket cards.
CRUDE OIL PURCHASING TABULATING
Run ticket cards and gravity price cards are merged by gravity for pricing.
ELECTRONIC CALCULATOR---
Gross value is computed on the run ticket cards by multiplying net barrels times price. (Using ½ cent pick-up)
Cards are sorted by leases for making tax summary cards.
ELECTRONIC CALCULATOR---
Excise, gross production, and other taxes are computed and total tax is subtracted from gross value to arrive at net value.
The royalty interests are figured on net value.
Check cards are prepared for royalty holders.

OPERATIONS INVOLVED in the calculation of oil-run tickets, crude-oil payments, and divisions of interests involved in such a simple transaction as the purchase and transportation of a barrel of crude oil. Fig. 1.

THE application of electronic computors in the petroleum industry is reducing the time and expense required for the solution of complicated problems formerly avoided. Answers on which to base decisions will be available to management almost concurrently with production line needs. This process will reduce costly errors and increase efficiency.

Electronic calculators . . . "Electronic brains," or automatic computing machines, are being used in increasing numbers in the solution of research, engineering, accounting, and statistical probelms.

Various types of automatic computing machines are contained within two broad classes: analog and digital.

Analog computers operate by the use of established systems, mechanical or electrical, which are analogous to the system under study. Examples of these computers are electrical network analyzers, mechanical and electronic differential analyzers, nomographs, and the slide rule.

The I. B. M. card - programed electronic calculator (which is the digital type), through its capacity to remember information, permits continuous operation on problems of a sequential or repetitive nature.

This combination of machine units includes a calculating unit that performs additions, subtractions, multiplications, and divisions at electronic speed. For example, when using five-digit numbers, this unit computes at the rate of 2,174 additions or subtrac-

Author is maintenance superintendent, Service Pipe Line Co., Tulsa.

Electronic Calculator Solves Pipe-Line Problems

for Service Pipe Line Co.

by Ernest A. Slade

Here is another example of how pipe-line companies are using punch cards and electronic calculators. It is part of a report from the 1953 A.P.I. meeting at Chicago, the other part of the report having been published in the Journal issue of November 16, 1953, under the title, "Designing Flexible Protective Casing for Pipe Lines, Using Electronic Calculators." Other Journal articles on pipe-line-company usage of calculators are: "Computing Gas Volumes via Punch-Card Systems," by Buchanan and Skinner (Magnolia), and "Calculation of Crude-Oil Run Tickets by Electronics," by Spinning (Shell) in the February 2, 1953, issue.

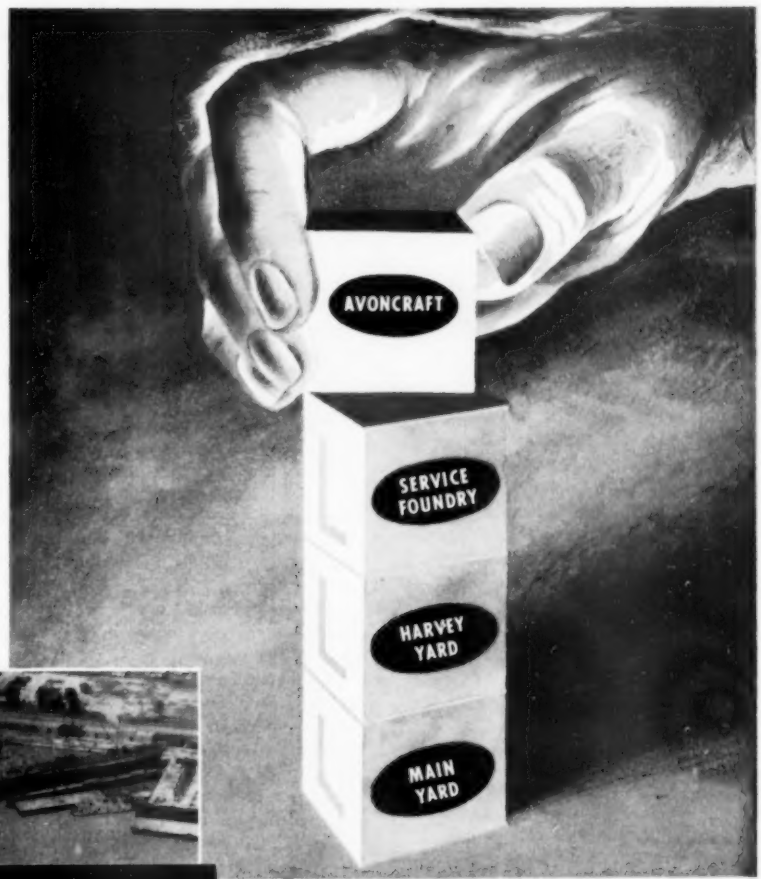
BRAINS, ELECTRONIC AND HUMAN . . . Loren R. Jenkins, machine group leader; Ernest A. Slade (author), maintenance superintendent, and Charles B. Carsten, tabulating supervisor, all of Service Pipe Line Co., Tulsa.

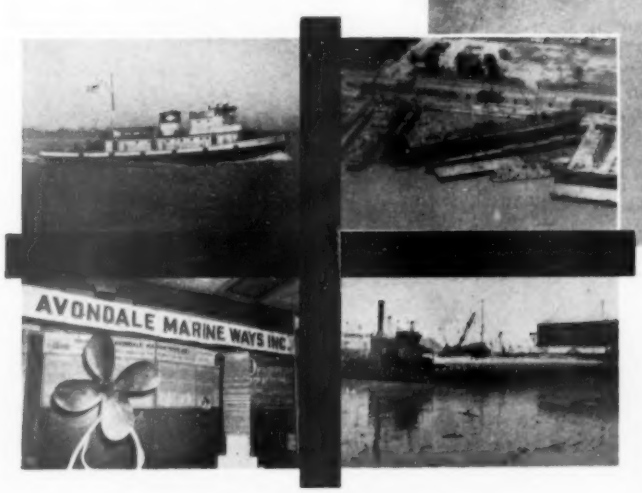
AVONDALE ADDS A 4th DIVISION

4 complete facilities for a well rounded service

Now . . . Avondale adds a 4th Division to its already-famous industrial trio. The new Avoncraft Division will manufacture one of the most recent and widely accepted building materials, architectural porcelain enamel on steel, in the form of load-bearing walls, load-span decking and curtain walls for exterior or interior building uses. The new plant will be located at Avondale, La. and production on a volume basis will begin about January, 1954.

Avondale's 4 big facilities will continue to serve the needs of the Maritime Industry . . . each and every one offering the type of Service that has made the name, Avondale, famous . .





***MAIN YARD** • Avondale, La. Ship and barge building and repairs, tank cleaning and steel fabrication.*

***HARVEY YARD** • Harvey, La. Quick repairs, drydocking, and propeller service.*

***SERVICE FOUNDRY** • New Orleans, La. Iron, steel and non-ferrous castings, cut gears, and large capacity machine work.*

***AVONCRAFT DIVISION** • Architectural porcelain enamel on steel load-bearing walls, load-span decking and curtain walls.*

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tions, 79 multiplications, or 65 divisions—in 1 second.

A stupendous task is presented to most pipe-line companies in the calculation of oil-run tickets, crude-oil payments, and divisions of interests involved in such a simple transaction as the purchase and transportation of a barrel of crude oil. This complicated job is now economically mastered with the punch-card computer. The operations involved in these calculations are shown graphically in Fig. 1. (Refer to The Oil and Gas Journal, February 2, 1953, "Special Business Machines Section," for additional data on the use of electronic computers in the oil industry).

Since common-carrier pipe lines must report to the Interstate Commerce Commission and various state regulatory bodies on the operations of their business, special accounting systems and methods of reporting must be utilized. Automatic computing machines have made it possible to supply the necessary data for these reports, as well as for the usual operating management reports, in a shorter time with minimum labor. Approximately 60 per cent of all accounting done by pipeline companies is required in preparing reports to governmental agencies.

Punch-Card Operations

(Continued from page 113)

column. This report is distributed to the geological department in order that they may evaluate the leases and make the appropriate notations as to "pay" or "not pay" the lease rental. This report is then reviewed at a meeting held by the chief geologist, manager of lands, and manager of exploration. Each lease is reevaluated and the action to be taken is noted on the master copy of the report under the remarks column. The report is then given final approval by the manager of exploration and is returned to the lease rental department in order that rental checks can be prepared.

The lease-rental checks, which are also printed by the I.B.M. tabulator, come in three parts and are distributed as follows:

1. Original check—to depository or individual payee.
2. Blue copy—retained by lease-rental department.
3. White copy—forwarded to accounting department.

Most of these lease-rental checks are forwarded to the depository bank named in the lease, with instructions to credit or pay the parties listed on the check stub. The check is designed so that the names and addresses of 10 parties can be listed on the stub. If the payment is to be divided among more than 10 people, a manual division order is attached to the check. An I.B.M. accounting machine automatically computes the rental share due the holders of mineral interests.

The tabulator also lists on a separate report in chronological due-date order, the date on which the lease rental checks are to be mailed. By comparing the rental checks against this list, a second safeguard against missing a rental payment is instituted.

After the last checks have been mailed for the month, a check register is prepared by the service bureau which lists in lease number sequence, under areas, the check number, rental-due date, net acres, current rental, deferred rental, total annual rental with a column for remarks. Under our system of accounting, that portion of the rental which is attributed to the year in which the rental is paid is classed as a current charge, and the balance of the rental payment, falling in the ensuing year, is classed as a deferred charge. Formerly these charges were computed to three percentage decimal places on calculators, which was almost a full-time job for one clerk. Now these computations are made on an I.B.M. accounting machine and listed on the check register, an operation which saves a great deal of time and money.

However, preparing and writing lease rental checks and related reports is only a portion of the work I.B.M. does for us. One of our most useful references is a report run by the I.B.M. tabulator listing our leases by number under township and range. If we wish to ascertain the number of leases in a specific area, it is a simple matter to obtain from the report the particular lease numbers desired as well as the net acres involved.

We also use our I.B.M. system to quickly obtain statistical information relating to our many leases. Formerly we had to manually compile and typewrite the information desired, a job that often took several days of painstaking work and proofreading. Today, mostly all reports of this type are compiled and printed by the I.B.M. tabulator. Aside from these special reports, we have the following reports printed every few months:

1. **Master list of all leases**—This is a consolidated report of all our leases and options, by area. The report is listed in lease number sequence showing the county, lease date, year of expiration, gross acres, net acres, annual rental and lease bonus.
2. **Lease expirations by counties**—This report lists all leases by counties in the order in which they expire.
3. **Lease expirations by states**—This report lists all leases by states in the order in which they expire.
4. **Lease due dates**—A report by states listing the leases in chronological due date order. This report is used as a mailing list and the lease rental checks are compared against this list as they are mailed each day.
5. **Leases by description**—A report listed by lease number showing the brief legal description and net acres.

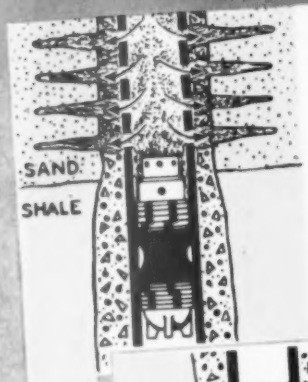
Commercial Business Service also prints a list of all payees to whom we pay annual lease rentals of over $600.00. This report is required by the Bureau of Internal Revenue each year.

Our I.B.M. system has been in operation for a period of 5 months and we are extremely well satisfied with the results. Not only have we reduced the cost of writing lease rental checks by 40 per cent over our former method, but we have reduced personnel from six to two rental clerks.

RENTAL DEPARTMENT, with Donna Addington at files, Robert Morton at desk, and Mary Senzek at adding machine.

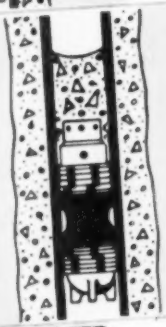
A few more ways in which operators profit with

Drillable Wireline Bridging Plugs



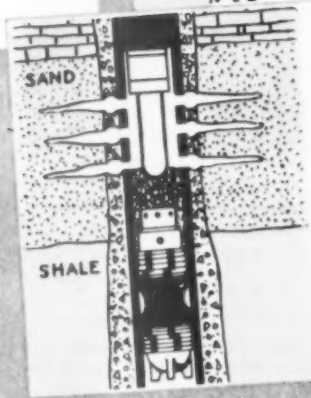
SQUEEZE OPERATIONS

Any operation requiring the application under pressure of cement, plastic or other types of materials can be done more efficiently using this bridging plug. It is quickly set and quickly drilled out. It is particularly useful where test perforations are being squeezed with cement or plastic during the testing of several zones in the same well.



ABANDONMENT

Lane-Wells Drillable Bridging Plugs provide pressure-tight plug which will outlast the casing for permanent abandonment. If required, a light cement cap may be added to the plug. The result is a quickly-placed, completely permanent plug job in the well. Plugs are often used to plug off each zone when upper zones are produced and abandoned successively.



FALSE BOTTOM

Lane-Wells Drillable Bridging Plugs are used to plug off a lower formation and provide a bottom on which to anchor the tubing in setting an anchor type packer. The plug, which is usually covered with a light cement or gravel cap, will provide a stable, rigid bottom which may be left for permanent abandonment if desired.

And here's WHY . . . Lane-Wells Bridging Plugs with greater clearance run in *fast*, on wireline—self-sealing elements give leakproof packoff under differential pressures as high as 10,000 p.s.i.—yet because of cast iron or magnesium construction drill out easily and quickly, with either rotary or cable tools.

Write for full information on the many uses for

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BRIDGING PLUGS

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Here is a magneto that controls explosive fumes with "flame-proof" ventilation. The special ventilating arrangement of the Bendix Low-Tension Magneto permits air laden with explosive fumes to enter the magneto for ventilation without danger of igniting the surrounding air. Kits are also available to convert magnetos now in use to the "flame-proof" ventilation type.

In addition to this important safety feature Bendix Low-Tension Magnetos actually reduce engine maintenance and operating costs. For example, spark plug erosion is reduced to a minimum. The distribution of low tension voltage to the high tension coils is through a series of breaker assemblies, thus eliminating trouble often experienced with the conventional distributor. Variable or fixed sparks can be obtained by internal adjustment.

For safety and low operating costs it will pay you to specify Bendix Low-Tension for all your magneto requirements. Complete data available on request.

- Low Plug Erosion Rate
- Breaker Type Distributor
- Ventilation without Fire Hazard
- Radio Shielding Available
- Variable or Fixed Ignition

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How to Develop Leadership

(Continued from page 88)

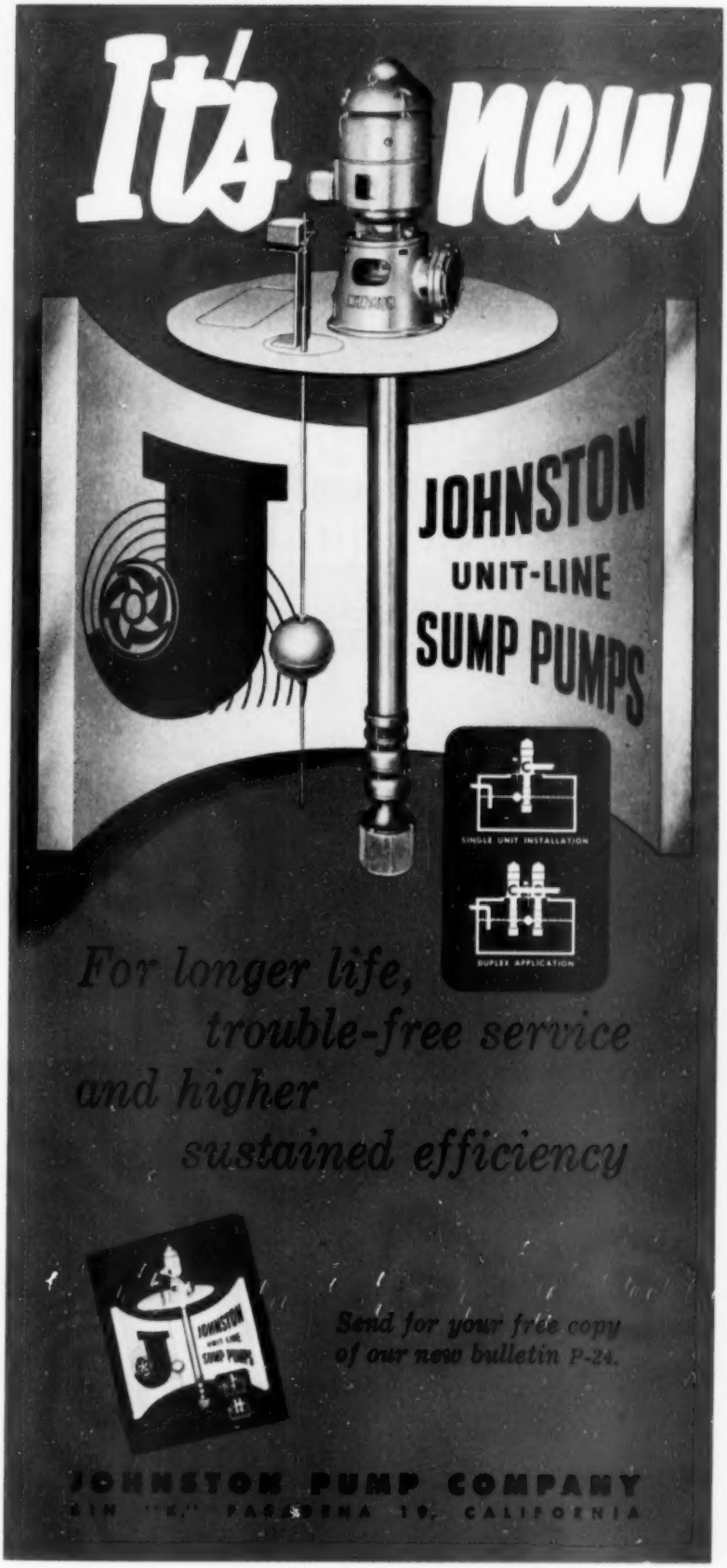
perience, it is essential that each assignment be of a nature that will permit measurement of performance. It is equally essential that the supervisor or individual in charge of the assignment follow the performance of the candidate closely and provide counsel and guidance as needed during the assignment. Finally the supervisor should prepare a complete and thorough evaluation report on the candidate's performance, to serve not only as a measure of his progress but also as a guide in planning future assignments. Such evaluation reports should, of course, be reviewed with the candidate so that at all times he is aware of his progress as well as his deficiencies.

Adequate guidance and counseling require not only genuine interest and a constructive attitude on the part of the counselor, but also a willingness on the part of the candidate to take an honest look at himself and to accept criticism in the spirit in which it is given—with the determination to profit from the experience.

Emphasis should be placed on motivation or encouragement of the candidate to take the steps that are necessary to improve his own effectiveness. You do not develop leaders by holding their hands or by making their decisions for them. Consequently, look at counseling as helping the individual to help himself.

Additional aids . . . In addition to adequate supervision, well-planned assignments, and effective counseling, there are many other things that can be done to assist in the development of leadership qualities. Those who need assistance in more effective oral or written presentation of ideas can be given additional instruction in report-writing, or they can be provided with opportunities for public speaking or conference leadership. Courses in business management may be available within the company or through colleges and universities. Conference series can be planned to provide an opportunity for studying specific case problems that will provide the members of the group with real experience in analyzing specific business situations, and in making decisions based on their analyses.

A continuing process . . . The process of developing leadership ability is a continuing one, as men advance from one level of responsibility to another. Consequently, the over-all plan of leadership development should be organized in relation to the needs of the business as a whole.



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LOW COST COATED TUBE STOODITE

(STOODY 1293)

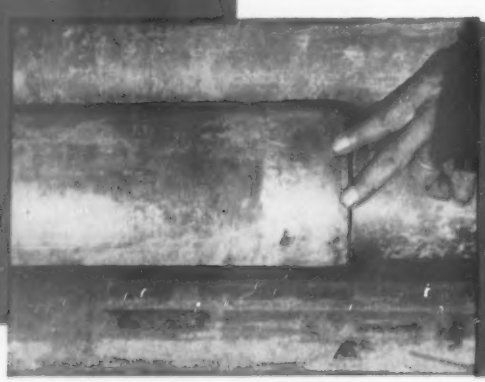
for Manually Hard-Facing Tool Joints!

COATED TUBE STOODITE is Stoody's answer to low cost manual hard-facing of tool joints. This new alloy readily bonds to most previous hard-facing deposits. Freedom from porosity and soundness of deposits is matched by very few hard-metals today. Welds easy—welds fast! Next to TUBE BORIUM you just can't buy BETTER wear protection!

Former hard metal deposit wore unevenly on this joint. COATED TUBE STOODITE is applied over thin side of old deposit restoring roundness and adding extra wear resistance.

TRY 50 POUNDS TODAY!

Compare COATED TUBE STOODITE with other rods of any price! Your STOODY Dealer will supply you—See the "Yellow Pages" in your phone book. Literature is available.



This joint has seen a lot of service! Note COATED TUBE STOODITE'S freedom from pits and pock marks, right down to the base metal!

STOODY COMPANY

11938 EAST SLAUSON AVENUE, WHITTIER, CALIF.

Portable Rigs Will Drill in 60-Ft. Water

(Continued from page 94)

mally should determine whether or not the discovery is big enough to justify the investment of development wells and permanent structures to protect the well heads.

Gas may be best payout . . . Another element motivating some of the offshore operators is the prospect that offshore discoveries are apt to be gas fields, and many figure that a good gas field will have a better payout than an average offshore oil field.

Naturally no good offshore oil discovery will be ignored, but a number of operators are so intrigued by the potentialities of gas that they are placing considerable dependence on studies of geological trends which indicate that much gas may be found within reasonable distances off the Louisiana coast.

Engineering Problems Limit Barge Design

One of the biggest engineering problems in designing drilling barges for deep water is the tendency of the rigs to be topheavy when raised for moving. This is particularly important because of the high winds and hurricanes often encountered in the Gulf.

The new barge of Ocean Drilling & Exploration Co. meets this problem partly by using a folding mast but chiefly by lowering the center of gravity by placing much of the drilling machinery in the bottom compartment.

The new Kerr-McGee barge retains the equipment on the upper deck but keeps the center of gravity low by careful engineering. In addition, this barge has side pontoons which give it added stability when afloat, and when on location these are sunk to the bottom to serve as supplemental anchorage.

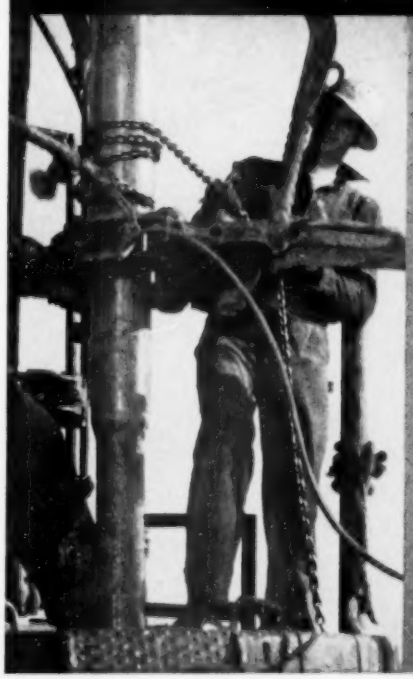
Like the Odeco rig, the Kerr-McGee barge is designed to drill in 40 ft. of water and still keep the drilling deck high enough above sea level to afford minimum exposure to wave action.

Kerr-McGee engineers designed the barge themselves, based on experience with other barges operated by the company in the Gulf, the largest of which will operate in 24 ft. of water. The company has asked shipyards to bid on construction of the unit, and hopes to have it in operation before the end of 1954.

Pontoon principle . . . Both the Odeco and Kerr-McGee barges are improvements on the basic design of the first successful submersible drilling barge

Smart drillers specify—

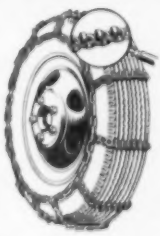
TAYLOR MADE
ALLOY STEEL
SPINNING CHAIN!

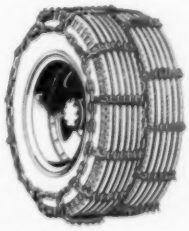


Greater strength, safety, dependability and economy than conventional Hi-Test types!

The superiority of Taylor Made Alloy Steel Spinning Chain over Hi-Test types is causing smart drillers everywhere to specify this famous new chain. Its short stubby links assure better grips. The fact that it's made from Taylor's *special analysis alloy steel* assures you of great strength, terrific resistance to cold working, grain-growth and shock at low temperatures. Hardness (Brinell 265-285) reduces wear. Complete and controlled heat-treatment removes the need of periodic annealing. Available in ¼" (9/32" actual size) and 5/16" (11/32" actual size). *Call your supply store today!*

TM V-BAR TIRE CHAINS
V-Bar construction assures total traction —doubles the chain life of ordinary old-fashioned types. Available for passenger cars and trucks (single or dual wheel).





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HERE'S ALL YOU DO: When your mud pump reduced size liners (see note) become worn and need replacing, just turn them in to your supply store.

HERE'S WHAT YOU GET: Your supply store will deliver to you a guaranteed Mission RENEWED Liner with Satin Finish* at 35% less than new liner cost. Mission RENEWED Liners are reworked both inside and out to new liner specifications.

HERE'S WHAT IT COSTS: Your old liner is worth 35% of the cost of a new Mission Liner of the same size. Thus, you get a guaranteed RENEWED MISSION LINER with SATIN FINISH* for only 65% of the cost of a new liner.

NOTE: There are a few makes of liners of special material that are not suitable for renewing.

BRING YOUR OLD LINERS IN TODAY TO YOUR SUPPLY STORE AND GET MISSION RENEWED LINERS WITH SATIN FINISH*

Guarantee

Mission RENEWED Liners with Satin-Finish* carry the same satisfactory service guarantee as new Mission Super-Service Liners.

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Emsco combines every feature long desired in this, the finest development in Ball Bearing Swivel Fittings. Exceptionally easy turning under heavy pressure or physical loading is an outstanding advantage. Remarkable sealing against leakage and easy servicing when needed prolong the usefulness of these fittings. Backed by Emsco, this excellent product is available for all services in a complete range of styles and sizes.

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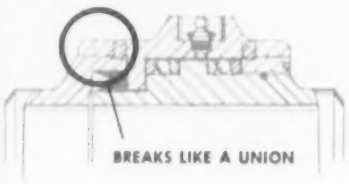
The packing of any Emsco Swivel Fitting may be readily removed from the Swivel Fitting Assembly without disturbing the rotating parts. This feature allows for the easy replacement of the packing element without breaking end connections.



When making inquiries or when ordering, simply tell us the nature of your application, the fluid, temperature and type of end connections required. Complete information awaits you.

EMSCO MANUFACTURING COMPANY

BOX 2098, TERMINAL ANNEX

Houston, Texas LOS ANGELES 54, CALIF. Garland, Texas

developed before the war by John T. Hayward, then with the old Barnsdall Oil Co. The principle is a submersible pontoon from which extend caissons supporting an abovewater drilling deck.

How far this principle can be carried into deeper and deeper water is a question which marine engineers are now arguing, but it is known that Odeco has on the drawing boards designs for two new barges, one for 40 ft. and one for 60 ft. of water. Only one of these will be built in the near future, and the choice will depend on the relative interest of operators in employing one or the other as well as on the feasibility of the engineering design.

However, inventors are by no means captive to the principle of the submersible barge. As a matter of fact, there seems to be no limitation on ingenuity in many of the schemes being hinted at for future use in waters of 100 ft. or even more.

Even diving bells containing complete drilling rigs have been proposed, but most of the ideas center around a floating platform supported rigidly from the ocean bottom by various mechanical means.

Double-hull considered . . . One idea receiving considerable attention is an adaptation of the double-hull design but having the upper and lower portions joined by retractable pilings instead of fixed caissons. These would operate much like automobile jacks to raise the lower pontoon to the surface for towing and to press it against the bottom for drilling.

Still other ideas revolve around a single hull from which huge legs unfold, spider-like, to rest on the bottom and raise the hull above wave level, thus forming what is, in effect, a huge submarine derrick supporting a drilling platform on which is a standard drilling rig.

Economics rather than engineering probably will determine the fate of these radical departures from conventional offshore drilling methods. Few drilling contractors are likely to rush to order an enormously expensive rig for drilling in waters of, say, 60 to 100 ft. deep, without pretty good assurance that there will be enough work to keep them busy and at rates per hole which will promise a payout.

So for the next couple of years, at least, it appears that the frontier of offshore wildcatting will lie close to the 40-ft. depth contour on the Gulf of Mexico. But this belt should see some pretty active development, and the engineering and economic experience here will determine when the next step-out will take place and what sort of equipment will be used.

DU PONT REG. U.S. PAT. OFF.

PETROLEUM CHEMICALS DIVISION

NEWS

DU PONT REG. U.S. PAT. OFF.

February ★ One of a Series of Interest to the Petroleum Industry ★ 1954

DEALERS will be able to keep him sold on your brand of gasoline with the aid of this new Du Pont folder.

Giving a satisfactory answer to poor starting complaints is a tough proposition for the average dealer. To help him handle the situation in a salesmanlike way, this new 4-page folder will give him the answers he needs—in a short, clear-cut fashion that is easy to remember.

Ask your Du Pont Petroleum Chemicals Division representative for a sample copy and information on obtaining a quantity for your dealers.

New, Comprehensive Booklet on Antioxidant Sweetening Now Ready

Since antioxidant sweetening offers many cost reduction and quality advantages over other sweetening methods, many refiners have asked us for technical information on the subject.

To fill these requests, Du Pont has prepared a comprehensive booklet on antioxidant sweetening. It contains more information on this process than ever before published in a single volume.

Cost-Saving Data

The booklet gives information on how you can reduce operating and sweetening equipment costs through the use of Du Pont Antioxidant No. 22. It also shows how you can reduce loss in gasoline or octane number through the efficient use of the process . . . as well as sweeten and inhibit your product in a single step.

Helpful Hints

The booklet fully explains the variables encountered in antioxidant sweetening. Helpful hints on how to control these operational variables for best results are also included. These will help you save considerable time and money in getting the process started in your refinery.

This basic, authoritative text on antioxidant sweetening is yours for the asking. Address your request for "Antioxidant No. 22 Sweetening" to any of the Du Pont Petroleum Chemicals Division regional offices.

Du Pont Publishes New Book on Medical Aspects of Tetraethyl Lead Operations

The first and only book of its kind . . . produced as an aid to refinery medical personnel

There has long been a need for a book of specialized information on the medical aspects of tetraethyl lead handling. With this in mind, three of Du Pont's physicians who specialize in tetraethyl lead problems have collaborated in bringing out a volume which covers this subject in an authoritative and comprehensive manner. The title is, "Maintaining Hygiene in Tetraethyl Lead Operations."

CONCISE, LOGICALLY ORGANIZED and written in a direct, clear style, "Maintaining Hygiene in Tetraethyl Lead Operations" can be extremely helpful to refinery physicians in explaining lead hazards and precautions to refinery personnel.

In spite of the toxicity of tetraethyl lead, an enviable health and safety record has been established by the refinery workers who regularly come in contact with this chemical. The chief aim of the new book is to help the petroleum industry maintain this outstanding record.

Safety As A Way Of Life

The theme of the volume suggests that *preventive* medicine – rather than medical care – is the real core of a successful industrial medical program. Its chief emphasis is, therefore, on helping refinery doctors and safety personnel *prevent* accidents resulting from improper or careless handling of tetraethyl lead.

But to prepare the refinery medical staff for *any* emergency related to lead poisoning that may arise, the text also

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

OVER

DU PONT

PETROLEUM CHEMICALS DIVISION
NEWS

DU PONT

CONTINUED *Medical Book*

includes specific data on the symptoms and treatment of poisoning from organic lead.

A Useful Reference

"Maintaining Hygiene in Tetraethyl Lead Operations" is a practical reference manual on a highly specialized field of industrial medicine.

Refinery doctors will find it extremely useful, for example, in setting up procedures for examining and advising workers in tetraethyl lead areas.

30 Years Experience

The Du Pont Company has been directly concerned with the manufacture and handling of tetraethyl lead for more than 30 years. It is from this experience — combined with constant, thorough study of the problems involved — that the authors of this book have drawn their material.

In addition to their work with employees in Du Pont's tetraethyl lead manufacturing area, the three authors of the book — Drs. Stewart L. Rankin, Lawrence A. Gerlach and Fenton Russell—have worked closely with refinery medical staffs on safe TEL handling procedures for many years.

THIS NEW Du Pont medical book is printed and bound, for durable use, between hard covers.

Limited Distribution

"Maintaining Hygiene in Tetraethyl Lead Operations" was written expressly for and addressed primarily to doctors in the petroleum industry to whom it will be distributed during the course of the year. A limited number of copies will also be distributed by Du Pont to oil company executives directly concerned with safety and medical procedures in the handling of tetraethyl lead.

Assistant Mid-Continent Regional Manager

DONALD W. FRISON, recently appointed assistant manager of the Petroleum Chemicals Division's Mid-Continent Region, has been with the Du Pont Company since 1947.

His first assignment with the company was as manager of the Mid-Continent District Laboratory. In 1951 he was transferred to the Wilmington office as technical assistant to the director of sales. He later became assistant manager of sales promotion and then assistant to the sales manager.

Before joining Du Pont, Mr. Frison was engaged in CFR engine work and refined petroleum products analysis at the Florida State Petroleum Laboratory. He graduated from the John B. Stetson University in Deland, Florida with a B.S. degree in chemistry.

During World War II, he was a petroleum officer in the U. S. Navy Bureau of Ships and was engaged in tanker loadings at the New York petroleum pool. Mr. Frison is a member of the Society of Automotive Engineers.

New Tank-Cleaning Safety Presentation Available to Refiners

Constant vigilance is *a must* for all personnel engaged in cleaning leaded gasoline storage tanks. But workers easily become bored—and sometimes careless —when safety rules and procedures are presented over and over again in the same old way.

To help overcome this situation, Du Pont has prepared a new, interest-arousing tank cleaning presentation. Our representatives first teach your own training staff how to use this tool—then leave it with you for use as you see fit. It is a penetrating, easy-to-understand training piece that your foremen can use with the tank cleaning crew for "tool box" safety meetings *on the site.*

Turn-Over Style

To make the presentation easy to handle and interesting to present, it has been put together in turn-over style. Copy of the talk and guides for the speaker are printed in large type on the back of each page. Pages facing the audience are illustrated either with colored cartoons or large sized photos of actual operations. All necessary safety precautions and procedures pertaining to the lead hazard are fully covered.

Distribution of the presentation will be limited to those responsible for the safety and training of tank cleaning crews. If you are interested in this important safety aid we suggest you get in touch with the nearest Du Pont Petroleum Chemicals Division regional office at once.

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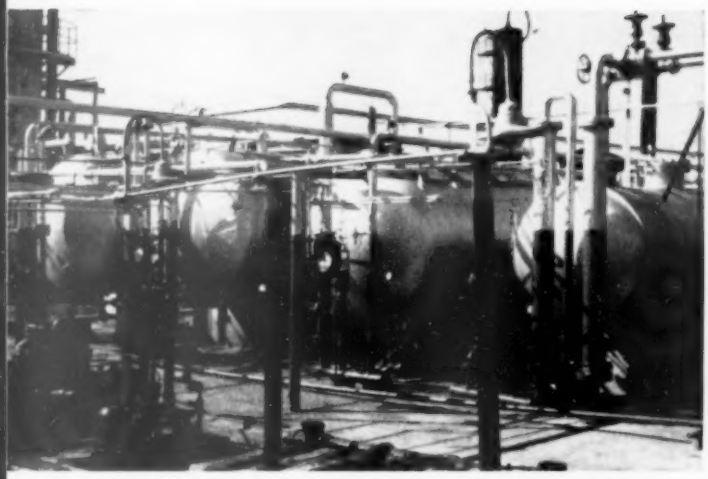
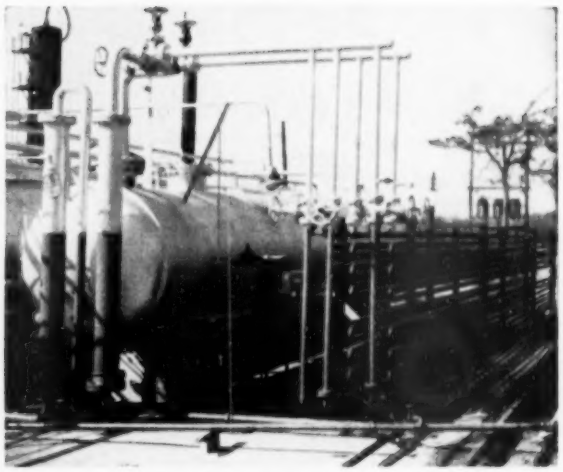


1 TREATING TANKS with flow starting at right through primary acid settler, then to secondary acid settler, and into caustic neutralization and wash tanks.



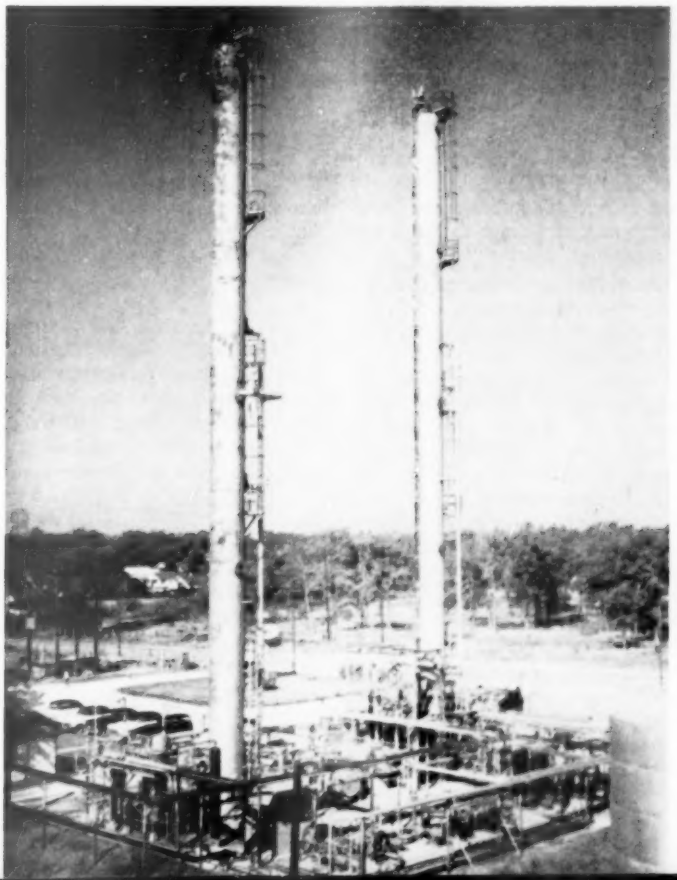
2 ACID AND CHARGE pass through these time coils before entering primary acid settler at left. Portions of coil sections may be bypassed as required.

PETROCHEM REPORT:

B.T.X. Conversion Pays Off

Processors, Ltd., converts surplus equipment into plant making benzene, toluene, xylenes.

by F. Lawrence Resen
Gulf Coast District Editor



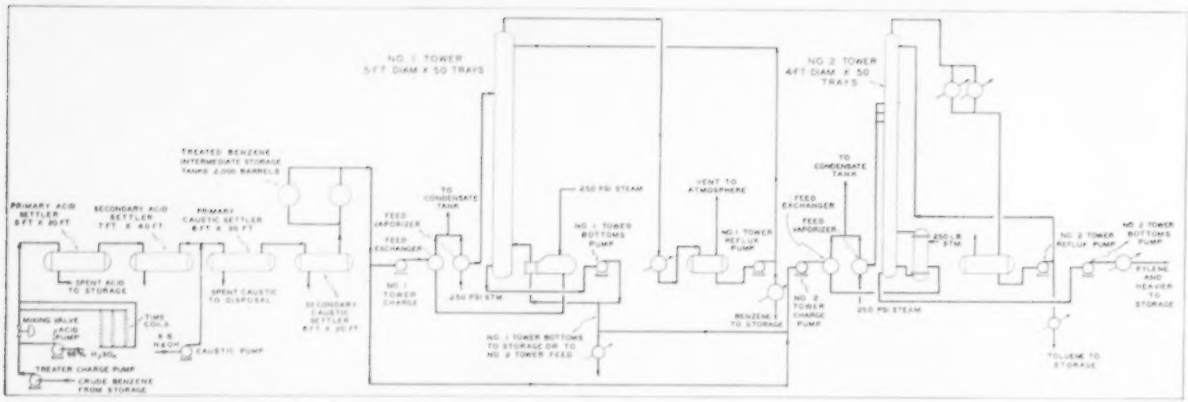
PREDOMINANTLY surplus equipment makes up the main plant unit at Processors, Ltd., Galena Park, Tex., specialties plant, where crude benzene, toluene, and xylene are processed into finished products, and custom processing operations are performed for petroleum and chemical companies.

Main items are two 50-tray towers, which may be used either in series or parallel to effect the desired recovery of pure products. A small crude still is additionally used for xylene recovery and specialty solvent recovery.

Site of the plant is the old Maritime Oil Co. refinery located a short distance from Houston and at a point where the crude still was originally located. The towers and associated equipment were added when the plant was converted to B.T.X. processing.

Operation . . . In the refining process, the crude aromatic charge stock is initially charged to a mixing valve where it comes in contact with 98 per cent sulfuric acid. The combined stock then passes through time coils made up of 2-in. pipe with necessary return bends, which are exposed to atmospheric conditions. Purpose of the coils is to allow more intimate mixing to take place between the acid and charge before they

3 THESE TWO TOWERS are used to recover pure benzene and toluene. They may be operated in series or in parallel. The latter operation is employed when maximum benzene production is desired.



Simplified flow diagram of Processors Ltd. benzene refining plant at Galena Park, Texas.

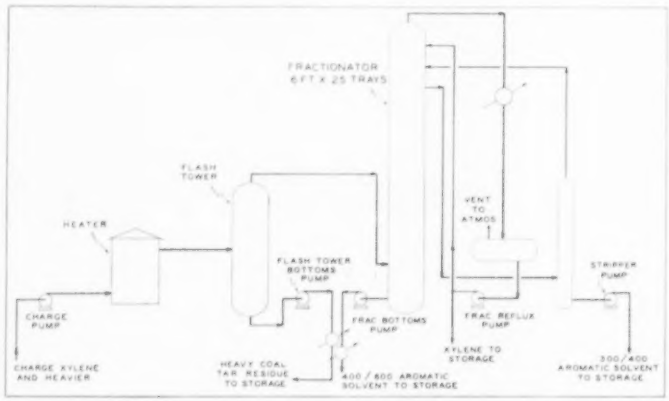
pass into a settling tank. Laboratory tests which follow the progress of the charge through the treating section are quite significant. These will be discussed later.

In the primary acid settler—a horizontal tank 5 ft. in diameter and 30 ft. long—the acid sludge separates from the aromatics layer, with the sludge withdrawn to storage, for return to a regeneration plant. The aromatic effluent is withdrawn into the secondary acid settler—7 ft. diameter by 40 ft.—where acid carryover can be removed prior to further treating. Again, acid sludge is withdrawn from the bottom of the tank to storage.

Caustic neutralization is effected in the primary caustic settler, which is a third horizontal tank 8 ft. diameter by 30 ft. Effluent from the secondary acid settler is carried over to this tank for contacting with caustic. Operating conditions permit the tank to be run at any desired level up to completely full, with the latter preferred. In this instance, caustic is added continuously, with spent caustic also being withdrawn continuously from the bottom of the tank.

The secondary caustic settler is the final step in the treating section, and effluent from the primary caustic settler enters this tank to be water washed before entering intermediate storage tanks. The charge to the fractionating portion of the plant is obtained from these tanks and consists of treated B.T.X., some polymers, and some heavy aromatics.

Fractionation . . . The two towers used in fractionating the charge stream are conventional petroleum fractionators with 250-lb. steam reboilers and conventional controls. Flow can be arranged so that the towers may be operated in either series or parallel operation. In series operation, the plant has a maximum operating capacity of 100,000 gal. per day, and is operated for production of all types of products. In parallel operation the plant is operated for maximum benzene production and 165,000 gal. may be charged daily, with intermediate products being sent to storage to await further processing.



Flow diagram of xylene recovery unit at Processors Ltd. plant.

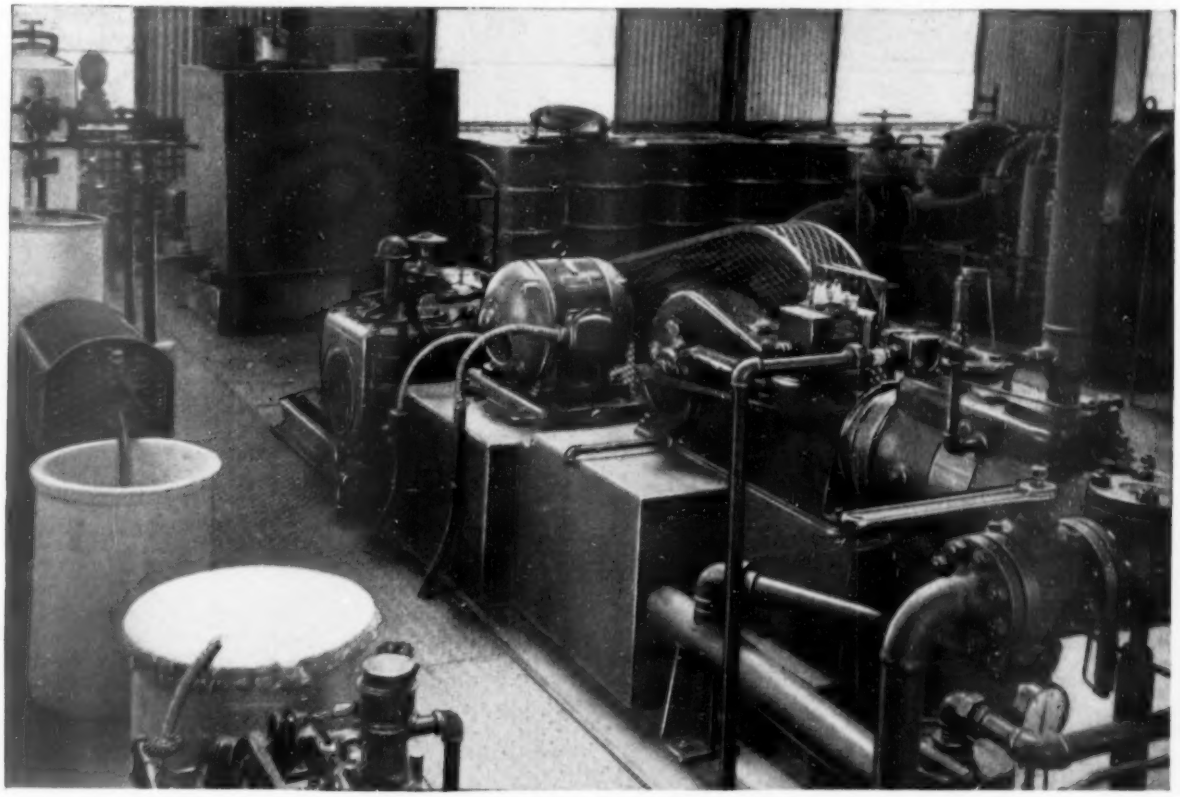
In series operation, charge first enters one fractionator having a 5-ft. i.d. and a total of 50 bubble-cap trays, after passing through two heat exchangers where steam is used for preheating effect. The charge enters the upper portion of the tower, with benzene vapors withdrawn overhead, condensed, and received in an accumulator before being sent to storage. The accumulator is vented to atmosphere, with suction being taken from it for the benzene reflux pump.

Tower bottoms are circulated through a 250-lb. steam reboiler, with a stream withdrawn for charging the second tower. In parallel operation, this stream would go to storage. The second tower also has 50 trays, but only a 4-ft. i.d., with the charge stock passing through two additional heat exchangers before entering the tower. Toluene is withdrawn overhead. Product is charged to storage.

Still . . . Tower bottoms, which contain xylenes and heavier, are charged either to storage or the crude still for further processing. The charge is first passed through a direct-fired furnace and then flashed into a tower before entering the 25-tray fractionator. The heavy residue from the flash tower is withdrawn to storage while the overhead vapors are charged to the lower portion of the 6-ft.-diameter fractionator. Overhead from the fractionator consists of xylene vapors, which are condensed and sent to storage.

A sidestream stripper is used to obtain a 300°-400° F. boiling-range aromatic solvent cut, with bottoms from the stripper going to storage and overhead vapors returned to the tower. Bottoms from the fractionator consists of 400°-600° F. boiling-range solvent and are charged to storage. The former cut has a high solvency range, rated 75-78 Kauri-butanol; the latter is used as a DDT solvent. Cumulative production at the plant from October 17,

Field tests prove ARQUAD T-2C cuts costs of secondary oil recovery and gives corrosion protection for your system!



Right here in the field, Armour's new Arquad T-2C has been tried, tested and *proved* by large petroleum producers. The results — over 95% corrosion protection reported in every case (in some cases, 99.5%) and complete control of sulphate reducers! Arquad T-2C also means less plugging of sands, less down-time for filter cleaning. And Arquad T-2C is an extremely *economical* corrosion inhibitor and bactericide — only 6 ppm does the job!

For free samples of Arquad T-2C and further information on all of Armour's Arquads (quaternary ammonium chlorides), send the coupon today! Technical Bulletin E-6, "Chemical Treatment of Oil Wells", and Technical Bulletin G-3, "Combat Corrosion", are also available. And remember that our research and development laboratory is equipped and ready to help you with your problems.

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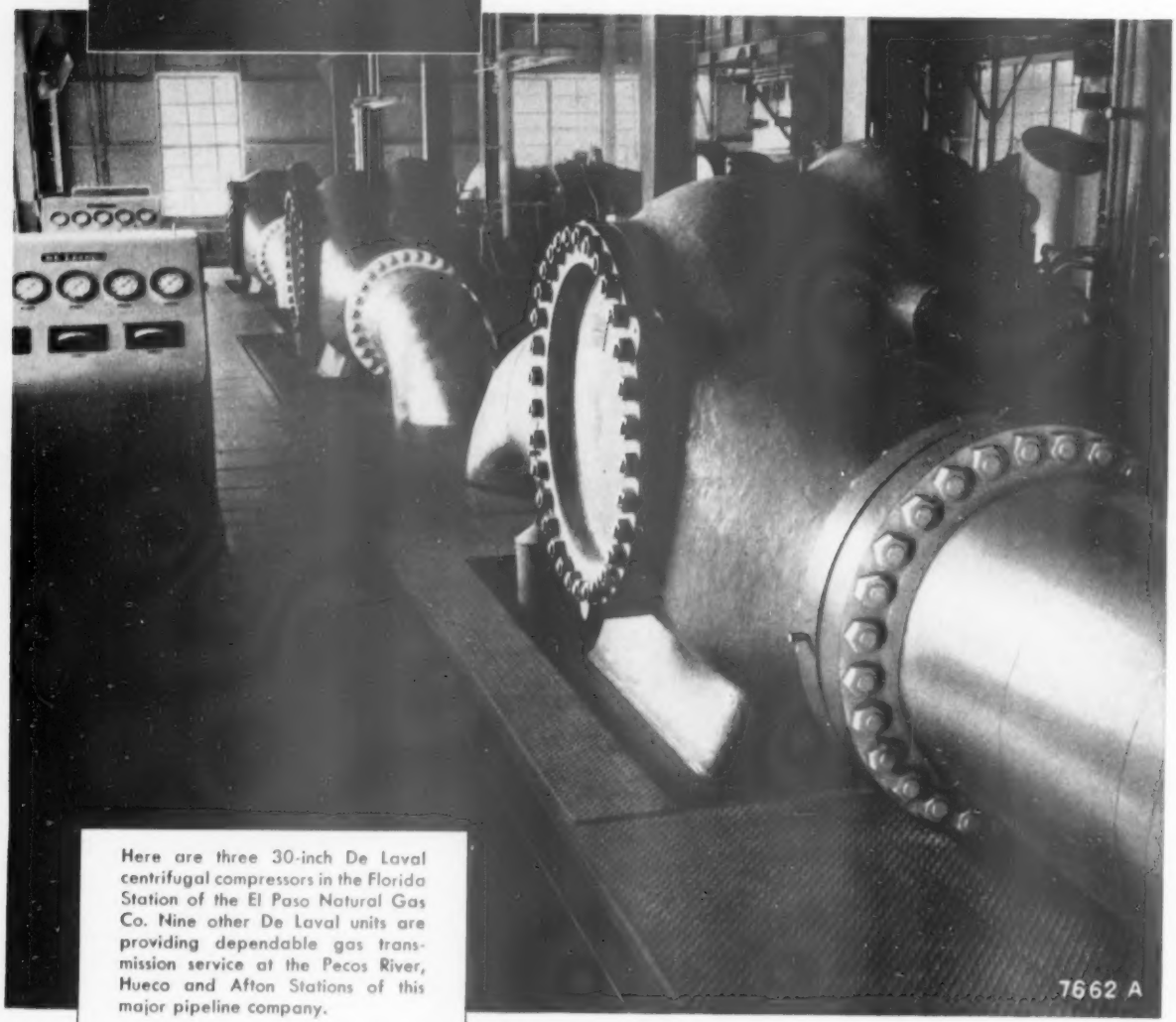

Here are three 30-inch De Laval centrifugal compressors in the Florida Station of the El Paso Natural Gas Co. Nine other De Laval units are providing dependable gas transmission service at the Pecos River, Hueco and Afton Stations of this major pipeline company.

De Laval centrifugal compressors offer many important engineering features. (1) They are designed to handle an increased ultimate flow, can be quickly converted to larger capacities by replacing the impeller, diaphragm and a few minor parts. (2) The high pressure shaft seal eliminates leakage, consumption of sealing oil is negligible. (3) There is only one moving part — the rotor — which has ample clearance. (4) Units are compact, require smaller foundations and smaller stations. (5) First costs and installation costs are low.

If you want detailed data on all the design advantages of De Laval centrifugal compressors, consult our engineers. They will be glad to give you the benefit of our wide experience on major pipelines.

DE LAVAL *Centrifugal Compressors*

DE LAVAL STEAM TURBINE COMPANY
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DL 220

1950, through October 31, 1953, amounted to the following:

Product—	Gallons
Benzene	60,000,000
Toluene	6,100,000
Xylene	1,400,000
300°-400° F. solvent	400,000
400°-600° F. solvent	300,000
Polymers	600,000
Aviation-gas-blending stock	3,300,000

Lab setup . . . Average operating conditions call for a use of 15-20 lb. of 98 per cent sulfuric acid per barrel of crude charge and 3-5 per cent of 9° B. caustic in the treating section. However, due to the wide variety of charge stock, a series of preliminary tests are run in the lab to predetermine approximate plant condition to simplify the actual operation.

Initially, the charge to be run is tested with various amounts of acid to determine the best ratio of acid to charge to use and the mixing time to maintain. The time coils are so arranged so that if the mixture of acid and charge is highly exothermic, one or more coils may be bypassed between the mixing valve and primary settler. Likewise, if the mixture requires a lot of contact time, additional time coils can be included in the process. The lab mixture is allowed to settle in a separatory funnel, where the condition of the interface will indicate whether or not the acid-charge ratio is sufficient. High emulsification naturally will indicate additional need for acid. In addition, if the sludge proves too difficult to handle with minimum acid injection, an increase in the amount of acid normally required will be necessary to dilute the sludge.

A similar arrangement is necessarily followed in the caustic treat by neutralizing the effluent in the separator funnel with various amounts of caustic. Here the desire is to reach an 8.5-9.0 pH range and once the caustic-charge ratio is determined an Engler distillation follows.

The preliminary checks provide an important means of saving on maintenance work, for they allow conditions to be set up which will not result in heavy acid sludge plugging the lines, nor in emulsified charge being carried through the processing equipment. Likewise, they afford a considerable savings in makeup acid and caustic, for once the best operation ratios are arrived at on a lab scale, the plant equipment will meet the requirements without undue losses.

Testing . . . An interesting feature in the laboratory is a stainless steel pipe column, 1½-in. i.d., packed with chain, which almost exactly duplicates operation of the plant columns. The 13-ft. column is used for making economic studies and monthly summaries, so that the plant's performance can be easily checked. A composite sample of material handled can be run through the column and if the plant's operations show a marked difference from the performance of the lab column remedial steps can be taken.

The refinery is also used for special processing and treating jobs for the petroleum and chemical industries.

The laboratory and operating skill developed during the B.T.X. operations where it was necessary to adapt operating conditions to suit widely varying charging stocks, are a useful background for this service. The flexibility of the equipment is such that it can readily be adapted to many other types of processing. For example, toluene has been acid treated for others to upgrade it for ordnance use. Outside the aromatic field, petroleum fractions have been processed to produce narrow fractions, heart cut, and specialty products. Dan Truesdell is manager of operations and development and John Allen is plant superintendent.

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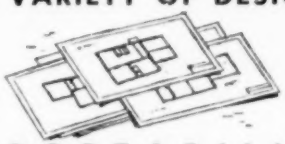

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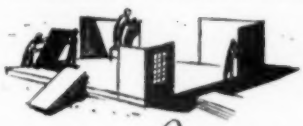

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STURDYBILT HOUSES COMPLY WITH COMMERCIAL STANDARD CS 120 OF THE NATIONAL BUREAU OF STANDARDS FOR PREFABRICATED HOMES

Department of Commerce Building, Washington, D. C., viewed from the intersection of Fourteenth and E Streets. Patent Office section in foreground.

What do you know about PATENTS?

Here's how the Patent Office functions in its job of giving the inventor the right to profit from his invention

by Bertram F. Linz
Washington Editor

YOU can patent any invention that's new and workable, and inventors from all sections of the country will receive more than 40,000 grants from the United States Patent Office this year. Over 1,000 of them will relate to oil production and refining and petrochemicals.

Very few of these inventors will hit the jackpot of wealth, but thousands of them will reap substantial financial benefits from their inventions. Other thousands, however, will have to be content with the official documents which shows they have a patent, because their invention has no commercial use or may be ahead of its time—the zipper fastener was patented in 1890 but didn't "catch on" for almost 50 years.

Patent Office records are not clear as to when the first patent was issued in this country for the development of the petroleum industry which started with the drilling of the first oil well in 1859, but it probably was within the next decade as seekers of oil adapted and improved upon the crude rig used on the Drake well. Nor is it readily ascertainable how many tens of thousands of patents have been granted as the industry improved its drilling methods, passed from primitive distillation to steadily more complex methods of refining, developed new oil products and entered into the chemical field.

You can patent anything that's new and workable, whether it be (as it has been) a device to enable a man with his arms full of groceries to tip his hat when he meets a lady, a "better" mouse trap (there have been thousands of them), or (as it may be sometime) a revolutionary motor for a space ship.

No "Perpetual Motion" Patents

Your invention may be a new chemical, a new method of doing something, a new mechanical device, or an improvement on any of them. You can't patent a mere idea or suggestion, a useless device, or a method of doing business, though, and you must be ready to demonstrate that your invention works, which bars "perpetual motion" machines.

Strangely enough, "patent medicines" are not patented. And the words "Patent Pending" or "Patent Applied For" on an article are merely notice to the world that a patent is being sought and do not protect against infringement. Only when the official document is issued by the Patent Office does an inventor begin to enjoy the 17-year monopoly which a patent confers.

The granting of patents was provided for in the Constitution and our present patent system was established by the first Congress in a bill signed by President George Washington in 1790, the first time in history that the right of an inventor to profit from his invention was recognized by the law of any nation.

The first act established a board to pass on patent applications, consisting of the Secretaries of State and War and the Attorney General. Administration of the law was placed in the State Department where a separate patent bureau was created in 1802 under a superintendent of patents whose title was changed in 1836 to commissioner of patents. The patent office remained in the State Department until 1849, when it was transferred to the Interior Department. In 1925 it was transferred again, to the Commerce Department of which it is a part today. From 1839 to 1862 the patent work was so light that the commissioner of patents also had the duty of collecting and publishing statistics and other information on agriculture.

"Nothing Left to Invent"

Starting with 3 in 1790, the number of patents granted annually increased rapidly and in 1844 the 1,000-a-year mark was reached. There is a story that in that year one Henry L. Ellsworth resigned as commissioner of patents because he felt there was nothing left to invent. The story probably is not true, but in his annual report Ellsworth did comment that the advancement of the arts "seems to presage the arrival of that period when human improvement must end."

What Ellsworth saw was 14,000 patents granted in a period of 54 years—about the number now issued annually. What he did not foresee was the more than 2,000,000 patents that would be granted in the next 100 years, the greater proportion of them in industrial fields of which Ellsworth could have no conception—the oil, electric, automotive, motion picture, communications, and electronic industries among many others.

To date, more than 2,675,000 patents have been issued by the Government and applications currently are coming in at a rate of about 1,400 a week. The Patent Office has a backlog of some 103,000 applications, most of them filed within the past year. It takes considerable time to process an application, depending upon whether any question arises regarding any claims of the inventor or interference develops. Interference occurs in about 1 out of 100 cases when 2 or more applications are filed almost simultaneously by different inventors claiming substantially the same invention and it becomes necessary to determine

DARLING VALVES

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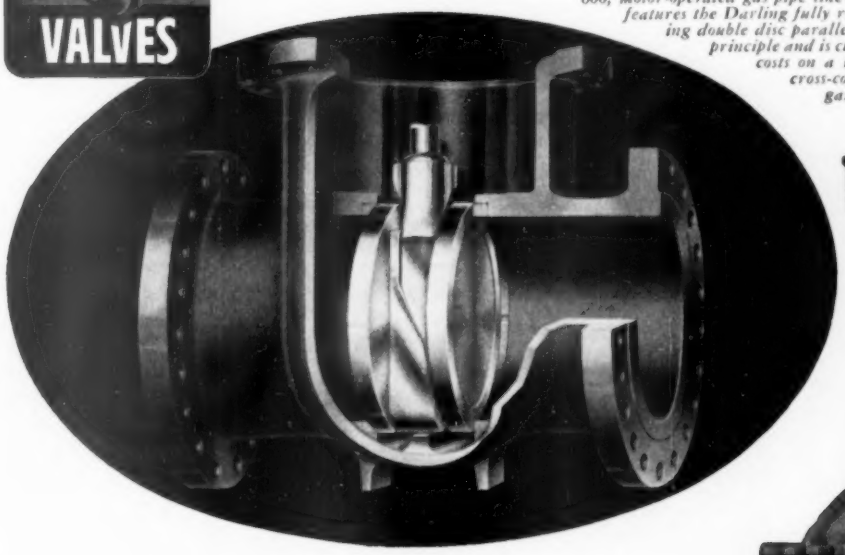

Like all Darling gate valves, this big 30" Series 600, motor-operated gas pipe line valve features the Darling fully revolving double disc parallel seat principle and is cutting costs on a major cross-country gas line.

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It will pay you to get better acquainted with Darling parallel seat gate valves. They come in a wide range of sizes and types for all gas and oil line requirements. Just outline your particular service needs or ask for a complete descriptive bulletin.

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ACCURATE GAS PRESSURE

The RS Standard Dead Weight Gage facilitates testing gas pressures; rock pressure at wells; static pressure on orifice meters and pipe line pressure in locating leaks. The design of the gage is based on the principle of applying pressure by a known weight to a hydraulic piston of known area; and of the converse effect to measure unknown pressure by balancing its force on a piston of known area with a known weight.

THE INSTRUMENT IS CALIBRATED TO INDICATE PRESSURES WITH A PRECISION OF 0.1%.

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A GOOD WAY TO DRAIN WATER FROM LIGHT LIQUIDS

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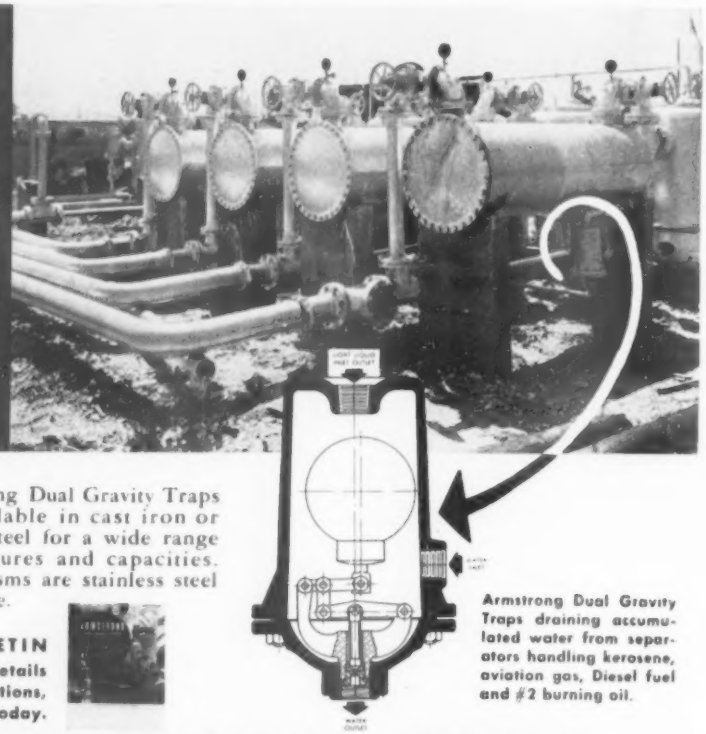

ARMSTRONG Dual Gravity Traps automatically drain water from light liquids. They eliminate manual draining and guesswork and prevent water from contaminating the light liquid.

Armstrong Dual Gravity Traps are available in cast iron or forged steel for a wide range of pressures and capacities. Mechanisms are stainless steel or bronze.

FREE—NEW BULLETIN

Dual Gravity Trap Bulletin No. 2091 gives full details — sizes, pressures, capacities, selection instructions, gravity conversion data. Send for free copy today.

Armstrong Dual Gravity Traps draining accumulated water from separators handling kerosene, aviation gas, Diesel fuel and #2 burning oil.

ARMSTRONG STEAM TRAP

ARMSTRONG MACHINE WORKS

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who is the first inventor and entitled to the patent.

When an application is received it is assigned to one of the 67 examining divisions, each of which is responsible for specific subjects. The application is reviewed to see that it complies with the legal requirements, and a search is made through prior patents and such other information that may be available to see if the invention is new. On the basis of his study the examiner may decide a patent should be granted in full, or he may allow some claims and reject others if they are not new or the difference over former inventions are not considered sufficient to justify a patent.

If an application is questioned or denied by the examiner, the inventor is given an opportunity to amend his claims or appeal for further consideration, and he may also carry a final decision to a Board of Appeals. To protect the inventor still further the law provides that appeals may be taken from the board to the Court of Customs and Patent Appeals or a civil action may be brought against the Commissioner in the District of Columbia Federal Court.

In addition to patents on inventions, the Patent Office also issues patents on new, original, and ornamental designs for an article of manufacture and registers trade marks.

WHO'S WHO IN THE PATENT OFFICE

Secretary of Commerce: Sinclair Weeks, Room 5858, Commerce Department.

Commissioner of Patents: Robert C. Watson, Room 1067.

Assistant Commissioner: Arthur W. Crocker, Room 1035.

Assistant Commissioner: Daphne Robert Leeds, Room 1064.

Solicitor: E. L. Reynolds, Room 1039.

Examiners-in-Chief:
- N. A. Asp, Room 7898.
- B. H. Carpenter, Room 7892.
- C. S. Duncombe, Room 7898-C.
- P. J. Federico, Room 1063.
- E. W. Geniesse, Room 7898-A.
- L. P. McCann, Room 1064.
- Mark Taylor, Room 7898-C.
- S. Wolffe, Room 7733.

Executive Examiner for Patent Examining Operation, M. C. Rosa, Room 5709.

Executive Examiner for Trade-Mark Examining Operation, John H. Merchant, Room 6212.

Want a Patent?... Here's How

IF you want to get a patent, here's what you should know:

A patent is a grant issued by the federal Government giving an inventor the right to exclude all others from making, using, or selling his invention within the United States, its territories, and possessions. It does not provide protection in foreign countries.

Any person, regardless of sex or age and whether or not a citizen of the United States, may secure a patent. Two or more persons working together to produce an invention may secure a joint patent.

Patents may be secured "on any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof." By the word "process" is meant a process or method, and new processes, primarily industrial or technical processes, may be patented. "Composition of matter, relates to chemical compositions and may include mixtures of ingredients as well as new chemical compounds. "Manufacture" refers to articles which are made, and includes all manufactured articles. The term "machine" needs no explanation. These classes of subject matter taken together include practically everything which is made by man and the processes for making them.

The Atomic Energy Act of 1946 carries the only limitation on the granting of patents. It excludes the patenting of inventions solely useful in the production of fissionable material and inventions for utilization of fissionable material or atomic energy for military purposes.

Design patents may be secured on "any new, original and ornamental design for an article of manufacture" but protect only the appearance of an article and not its structure or utilitarian features.

No patent will be granted on a useless device, printed matter, a method of doing business or an improvement in a device which is the result of mere mechanical skill, nor for a machine that will not operate as claimed.

An invention is not considered new if it was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention by the applicant for patent; if it was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than 1 year prior to application for patent; or if it has been described in a printed publication anywhere in the world, or if it has been in public use or on sale in this country, before the date the applicant made his invention, or has been described in a printed publication anywhere or has

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been in public use or on sale in this country more than 1 year before the date on which application for patent is filed.

Patents on inventions run for a term of 17 years. Design patents are for 3½, 7, or 14 years, as selected by the applicant. After a patent expires anyone may make, use, or sell the device without the permission of the patentee. The term of a patent is fixed and can be extended only by a special act of Congress.

An application for a patent consists of a petition and specifications describing the invention, to be sworn to, and in most cases a drawing. It must be accompanied by a filing fee of $30 on applications with 20 or fewer claims and $1 for each additional claim over 20. Before the patent is issued a final fee must be paid in the same amounts. The filing fee for design patents is $10, $15, or $30, depending on the length of the protection period sought.

Until 1880, it was necessary to submit models of inventions with the applications for patents. Models are no longer required, although the Patent Office has the right to demand them if they are deemed necessary to determine whether an invention is patentable.

Inventors may prepare their own applications and file them and conduct the necessary proceedings, but unless they are familiar with these matters, officials warn, they may get into considerable difficulties, particularly in making certain that the patent obtained would adequately protect the particular invention.

Most inventors employ the services of patent attorneys or patent agents, who are admitted to practice before the Patent Office under rules and regulations it has established, but only attorneys may conduct patent litigation in the courts.

It is not necessary to go to Washington to transact business concerning patent matters. In general all business with the Patent Office is conducted by correspondence.

It is advisable for an inventor to make a search of patents and other records before applying for a patent, saving fees if it is found his invention is covered by a prior patent. Such searches may be conducted in the Patent Office files in Washington or in libraries in many cities which have bound copies of United States patents.

The Patent Office has no jurisdiction over a patent after it has been issued.

Lyons Sandstone

(Continued from page 108)

"Dune sand contains extensive, though undulating truncating surfaces; but these surfaces are not like the plane surfaces which characterize the Lyons sandstone. The attitude of laminae of dune sands, moreover, is extremely variable both as to direction and angle of dip. Dune sands do not display the approximate parallelism of strike which characterizes laminae of both the Lyons and modern beaches. Hence, deposition of the Lyons does not seem to result primarily from eolian activity. That dunes prevailed at times is adequately recorded southwest of Lyons and South St. Vrain Creek by the lens of sandstone containing typical eolian-frosted grains of two sizes, the larger of which composes the smaller percentage.

"Once the general concept of beach origin is accepted, numerous otherwise seemingly passive considerations fall into place in the general scheme. Their collective weight presents compelling argument in favor of the involvement of shore processes."

References

1. Eardley, A. J., "Structural Geology of North America," (1951).
2. Condra, G. E. and E. C. Reed, op. cit, page 26.
3. Thompson, Warren O., "Lyons Sandstone of Colorado Front Range," Bull. A.A.P.G. Vol. 33, No. 1, (1949), pp. 52-72.
4. Thompson, Warren O., op cit., page 70.

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Simplify Your Oil and Gas Calculations—6

by Louis J. Murphy
International Engineering Associates, New York

THIS is the first of three charts dealing with refrigeration requirements in dewaxing of lubricating oil. The chart makes it easy to determine B.t.u. of heat removed and tons of refrigeration required for a given weight of oil cooled in unit time. Example for use with chart will be given later.

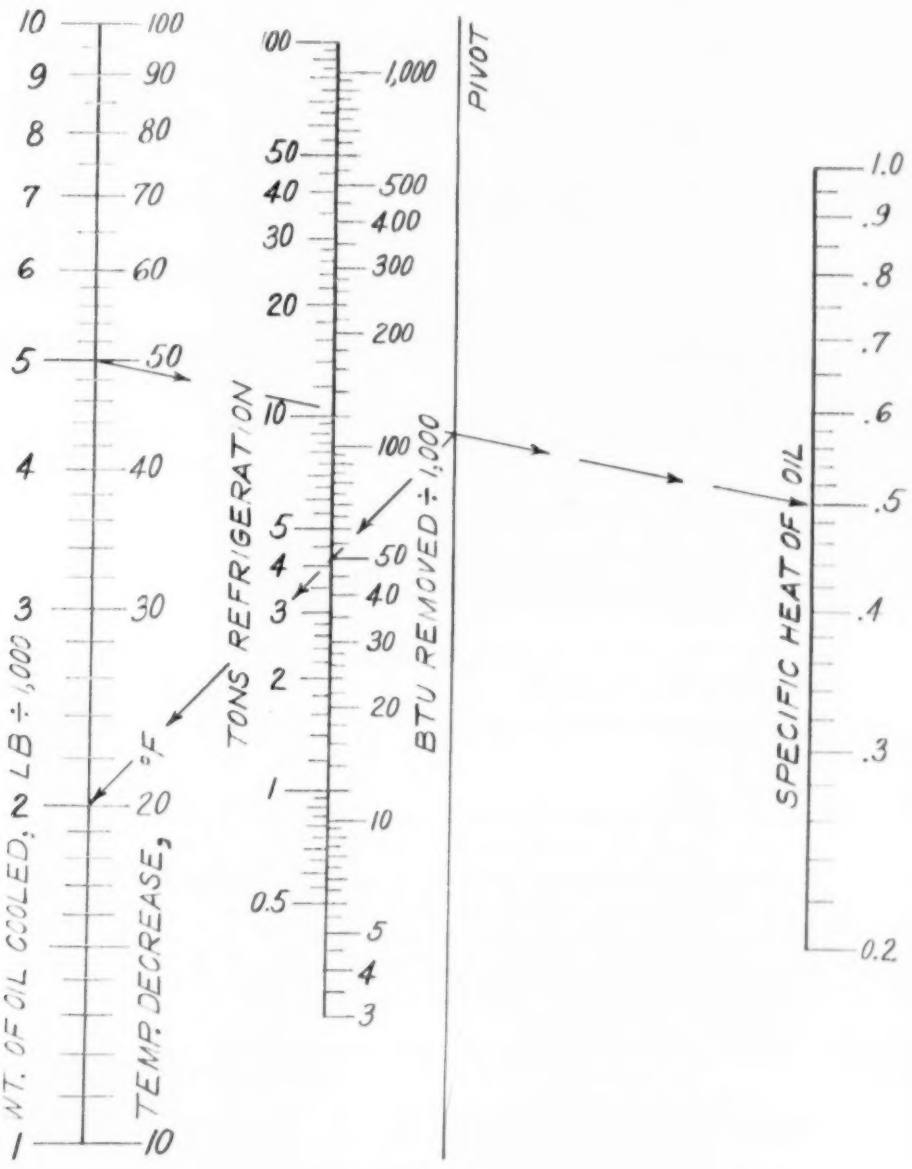
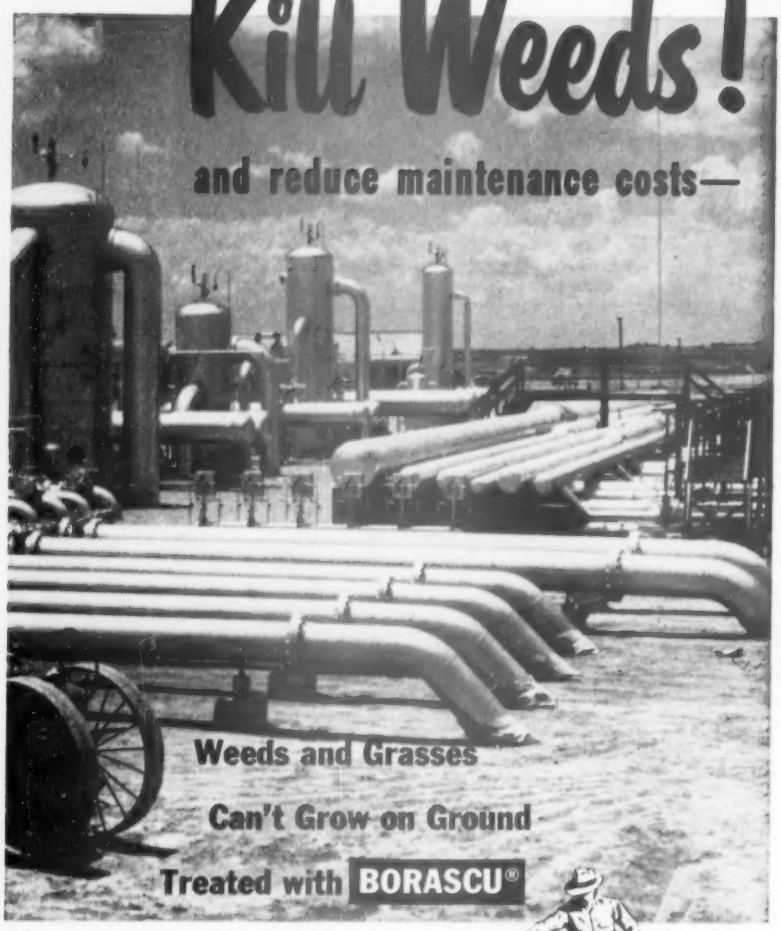


Chart 6

Here's the easy way to Kill Weeds!

and reduce maintenance costs—



.....a single application may keep an area cleared for 1 or 2 years!

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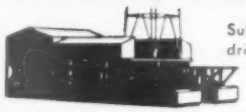
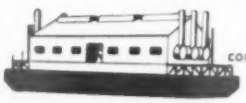

Submersible drilling barges

Tugs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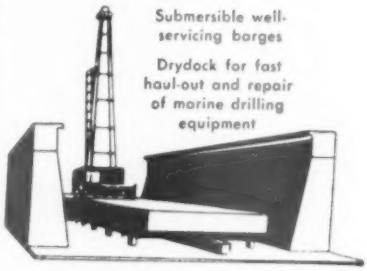
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Part 7 of 7 Parts

Underground Corrosion

CORROSION CONTROL

New Techniques in Control

by O. C. Mudd

THIS is the final installment in a series which began on November 30, 1953. Installments have appeared at intervals since that time.

Backfill Precautions

Pipe lowered in to the trench with coating intact may be damaged during backfill operations. The impact of heavy solid materials such as rock, clods, or debris in the backfill falling against the pipe can cause fracture of brittle coatings or penetrate and scar soft or pliable types.

More damage may occur as the backfill settles. Hard objects already in contact or near the coating are carried downward against the top pipe surface or wedge against the side during settlement causing coating displacement. This action may be slow depending on soil types and its moisture content.

Consolidation of the backfill may be complete within a few months where rainfall is frequent and a high soil moisture content prevails, while that in arid sections may take several years.

Author is senior corrosion engineer, Shell Pipe Line Corp., Houston. Paper presented before session on transportation, annual A.P.I. meeting, Chicago, November 10, 1953.

Damage by impact during backfill and much of that occurring afterwards during settlement can be minimized where there is enough fine material included in the excavation by towing a metal shield or "lizard" along the top of the coated pipe while the backfill is progessing. This moving shield should cover the upper half of the coated pipe and provisions made to prevent rock particles or similar objects from going under the shield as it is moved.

This shield protects the coating from impact and the movement along the pipe assists in sifting the finer particles down alongside the pipe and diverts or rolls sharp edges of rock away from the shield surface thus leaving a backfill less liable to damage the coating. The use of such a shield is illustrated in Fig. 14.

Coating damage . . . After backfill consolidation, coating damage can also occur from soils that shrink or expand with change in moisture content. This type of damage continues as long as the pipe remains in place hence it is important to consider coatings with good resistance to such action.

Trench through rock and backfilling with the excavated material is one of the most perplexing problems in preserving good coating. Padding rock trench bottom and making the initial backfill with fine loose material such as top soil to give near uniform support and coverage of the coated pipe is a frequent practice.

Such soil padding has been washed from rocky trenches by heavy rains after backfilling and severe coating damage resulted, hence it is advisable to take precautions in diverting surface drainage away from such trenches.

Whenever the pressure against most currently used coatings exceeds 10 psi., severe damage will occur within a few weeks. The occasional practice of supporting coated pipe on loaded sacks or soil mounds at intervals results in coating impairment at the support points.

Crushing rock for padding has been tried with promising results; however, manufacturers must design more suitable equipment. Calculated costs on a trial, including operation, maintenance and depre-

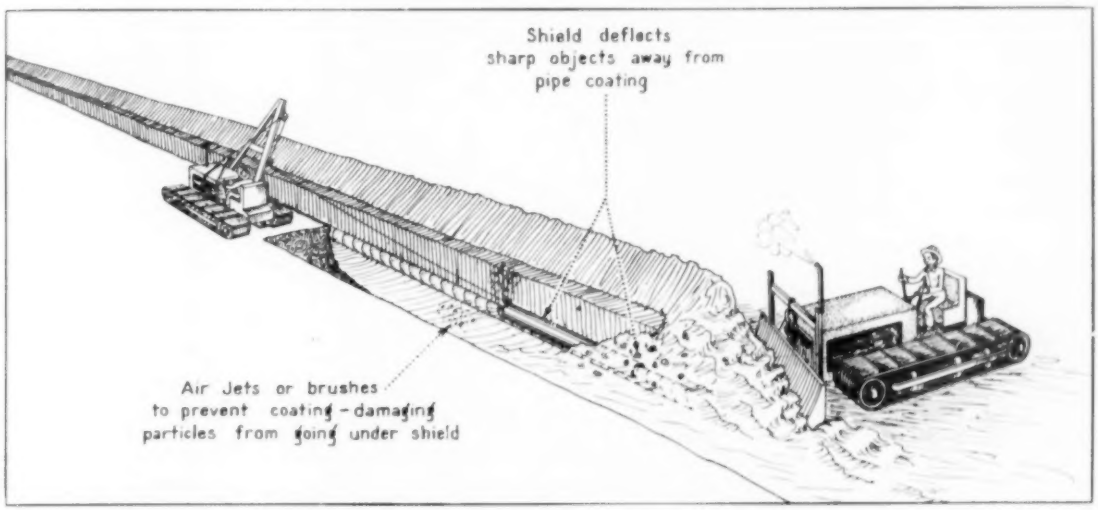


Fig. 14—Showing how shield protects coating from damage.

ciation, indicated less than $0.30 per cubic yard to crush stratified lime rock to a size suitable for use in the trench bottom and initial backfill.

Rock shield . . . Rock shield is quite effective in preventing coating damage by impact; however, the metal backfill shield mentioned earlier is effective for this purpose and it has the additional advantages mentioned above and is less expensive.

Tests on many of the rock-shield materials offered show a poor resistance to penetration by continuing pressure points. They are not a substitute for trench padding and proper backfilling. Penetration rates were obtained from the improvised penetrometer shown in Fig. 15.

The penetrometer has a cone point with a 120° included angle and a ⅜-in.-diameter base loaded to 132 lb. representing the pressure exerted by a pointed or sharp edge rock in supporting a lineal foot of 24-in. line pipe filled with oil. Results from these tests are given in Table 1.

Coating Wrapper and Reinforcing

Protective wrapper over coating serves one basic purpose i.e., to prevent soil adhesion to the coating surface that may pull areas of coating from the metal surface as the soil shrinks during moisture loss. The wrapper also prevents migration of sand grains and small particles in to the coating surface to cause impairment.

Asbestos is the most stable and practical material as a protective wrapper used thus far and since it serves primarily as a soil cleavage surface there is no object in using excessive weight materials. Asbestos wrapper impregnated with a suitable binder, but with the outer surface finished or left natural white could save the cost of whitewash applications where required. A product that can be applied satisfactorily with the lowest cost of delivery to the job is obviously desirable.

Glass-fiber reinforcing mat serves the same purpose in any coating material as reinforcing steel does in concrete. It helps prevent cracking, checking, and loss of bond by increasing the coating tensile strength. It also impedes coating cold flow thus reducing the amount of coating damage as compared to the same coating without reinforcing.

Conclusions . . . The effectiveness of corrosion control measures can be improved by modifications that give better results from materials and energy presently used in mitigation measures. This includes construction features conserving protective current; adapting or designing some accessory equipment to withstand the destructive forces to which they are exposed; and a choice of protective coating materials having potential service life at a reasonable cost.

The full value of any material or method can be realized by those competent to obtain the desired results, hence trained personnel are essential in gaining improvements. There is a vast difference in results obtained by those that only know "how" to get results and those that know "why" they can get these results.

Adequate supervision during construction by competent personnel interested in maintaining the line in operation afterwards assures better results. Competent supervisors should not tolerate careless workmanship or methods and should enforce reasonable procedures conforming to specifications.

Capable and well-trained personnel are assigned to specific duties only when management has sympathetic and understanding attitude toward the assignment. The importance of underground corrosion control is ever increasing due to larger investments, necessity of better operating continuity, and greater potential damages from line failures. It is up to management to determine how well these measures of conservation are to be done.

TABLE I—ROCK-SHIELD PENETRATION-TEST RESULTS

Penetration by ⅜-in. Base 120° Cone Loaded to 132.18 lb. Temp. 77.5° F.

Test No.	Average Thickness (in.)	Average Penetration Time (minutes)	Designation of Type or Additions to Asphalt Base
13	.248	240.00	Roofing scraps
15	.143	60.00	Roofing scraps
14	.180	60.00	Roofing scraps
5	.181	40.00	50 per cent limestone
11	.199	38.50	20 per cent sand
1	.215	36.50	Extra heavy
12	.248	29.00	30 per cent limestone
3	.156	27.50	Extra heavy
8	.151	15.75	Heavy duty
7	.216	11.75	50 per cent rock asphalt
16	.110	8.75	Regular
17	.168	4.50	75 per cent rock asphalt
4	.174	4.50	Regular
2	.175	4.00	Standard
6	.169	1.50	Standard
9	.159	1.50	Single liner
10	.132	.50	On glass felt

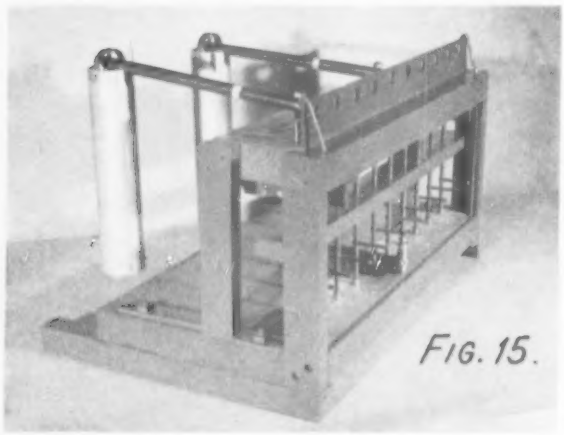
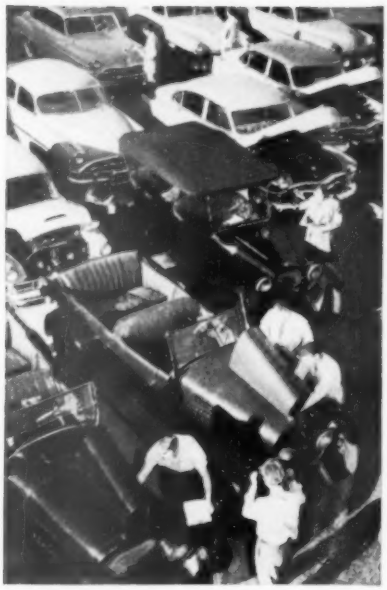
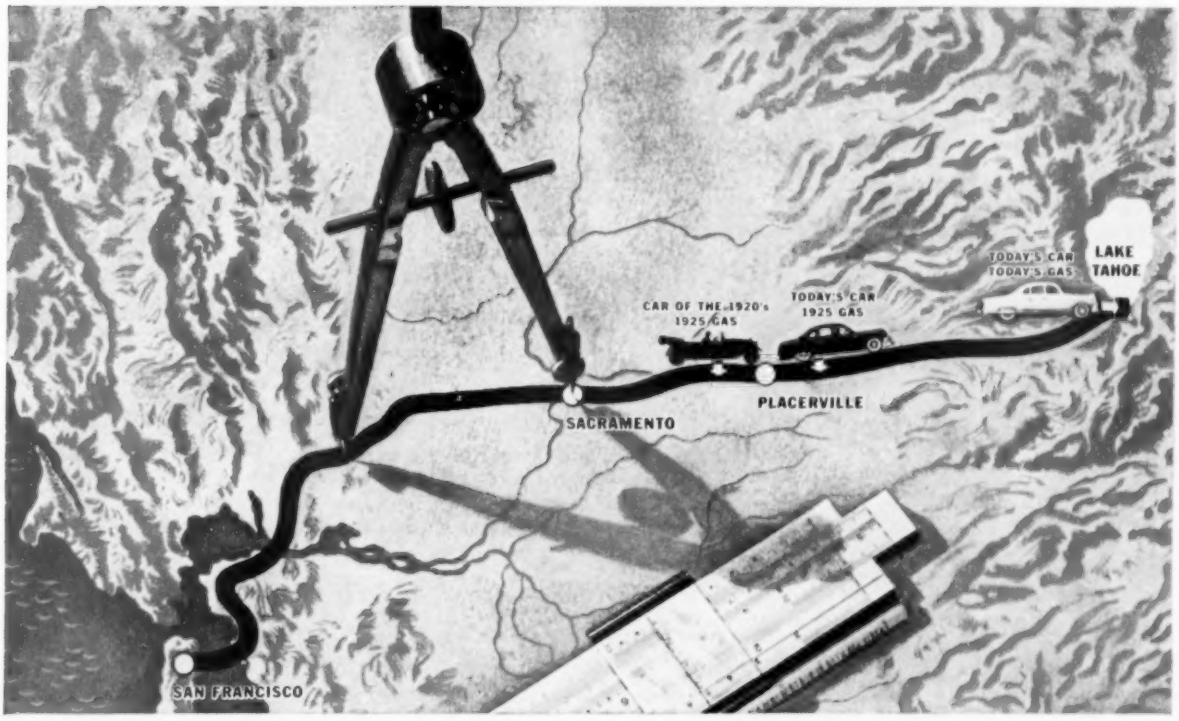


Fig. 15—Improvised penetrometer.



Drivers find gasoline cost per mile down 20%

To compare gasoline values now with the "good old days," test drivers at Standard ran popular cars of the 1920's on 1925 gas, '53 models of the same makes on today's gas, and '53 models modified to use 1925 gas. All cars were driven over the same course, on the same amount of fuel till they ran out of gas. The results may surprise you.



Today's gasoline gives you, under comparable driving conditions, 50% more miles per gallon than in 1925! What does it mean to you? Suppose you started on a trip from San Francisco to Lake Tahoe with 12 gallons of gasoline—a route covering all kinds of driving. In the old car with 1925 gas, you'd travel about 131 miles; in the new car modified for 1925 gasoline you'd go 149 miles; but in the new car with today's gasoline, you'd go all the way to Lake Tahoe, 196 miles. Improved auto engines explain part of this —but better gasolines made them possible. You benefit steadily from the competition in research and operating efficiency between Standard and other oil companies. Competition steps up gasoline quality, helps hold prices down. While living costs have risen 54% in the last 28 years, today's gasoline costs you only 22% more a gallon (except for taxes) . . . *gasoline cost per mile has dropped one fifth!*

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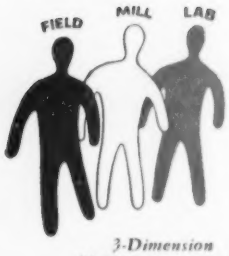

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ELECTRIC LOGGING—19

Apparent vs. True Resistivity

by R. I. Martin

WITH mud resistivity, Rm, taken as unity in the case where invasion is negligible, the quantities to be considered for analysis are threefold: Ra/Rm, Rt/Rm, and AM/d; where Ra and Rt are apparent and true resistivities, respectively, and AM/d is the ratio of electrode spacing to hole diameter.

Fig. 1 shows the relationship between these quantities. Values of AM/d are plotted as abscissas, values of Ra/Rm as ordinates, while each curve corresponds to a particular value of Rt/Rm.

If, for example, Ra/Rm is equal to 15, and the corresponding value for AM/d is 1, this point is found to lie on the curve Rt/Rm equal to 20.

Referring to the chart it may be seen that as the value of AM/d becomes smaller and smaller, all the curves converge towards the ordinate Rt/Rm equals 1, to which they are asymptotic. This result is not surprising because an extremely small electrode spacing will measure mostly the mud resistivity. The response of the monoelectrode discussed previously can be demonstrated here. For a monoelectrode of diameter 4 in. (radius of 2 in.) in a 10-in.-diameter hole, AM/d is equal to 0.2. If values of true resistivity range from 1 to 100 times Rm, all the corresponding apparent resistivities are included in a range of approximately 1 to 10 times Rm.

Consider now the curve which shows the values of Ra/Rm for Rt/Rm equal to 10. This curve crosses the ordinate Ra/Rm = 10 at a point corresponding to a ratio AM/d = 1.4. The same curve attains its asymptotic value when the ratio of AM/d is greater than 20. The apparent resistivity is equal to the true resistivity when the spacing AM either is equal to 1.4 times the hole diameter or is greater than 20 times the hole diameter.

A similar observation applies to all curves. A true reading can be obtained either with a short spacing having a length slightly greater than the hole diameter, or with a very long spacing. In practice a short spacing is more desirable because it gives a better determination of formation boundaries, for the more general cases when the beds are not infinitely thick. Also, more beds are likely to be found infinitely thick with respect to a small spacing.

If the points, where Ra/Rm is equal to Rt/Rm on each of the curves, are joined together a curved line n n' is obtained. This line has a large radius of curvature and, for values of Rt/Rm between 0.01 and 100, is contained between the abscissas, AM/d = 1.2 and AM/d = 2.6. Thus a spacing of AM between 1.2 d and 2.6 d will give apparent values which are close to the true resistivities for a range of Rt/Rm from 0.01 to 100.

The short normal spacings in standard use generally fall between these limits of 1.2 d and 2.6 d for hole diameters of 8 to 11 in.

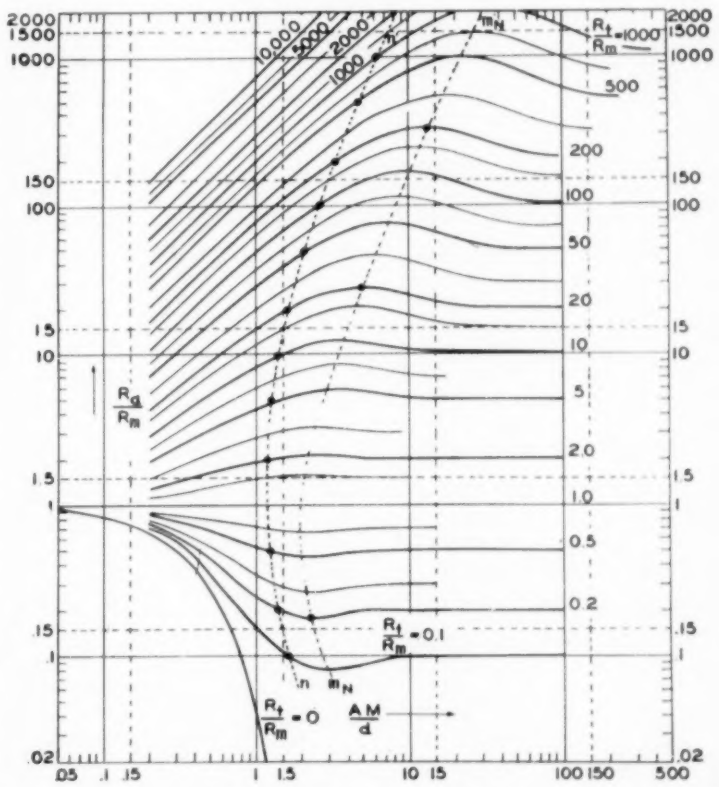

Fig. 1—For the case of negligible mud invasion, the relationship of the apparent to the true resistivity may be established from knowledge of the mud resistivity, the electrode spacing and the hole diameter. (Schlumberger Well Surveying Corp. Document 3, 1949.)

Author is assistant professor of petroleum engineering, Missouri School of Mines and Metallurgy.

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by W. L. Nelson
Technical Editor

QUESTIONS ON TECHNOLOGY

Comparison of Straightrun and Cracked Distillates or Diesel Fuels

"When changing from straightrun to catalytically cracked fuel-oil blends, what precautions are necessary? Can you compare for us, the properties of straightrun and catalytic fuels?" J.C.M.

Increasingly since 1930, it has been necessary to utilize some cracked distillate into the middle-distillate fuel oils because the straightrun distillates were needed as cracking stock. Recently the situation has been made more difficult by the fact that catalytic units must operate on substantially straightrun feed stocks. Thus, when the demand for kerosine (or No. 1 distillate), high-speed diesel fuel, and catalytic charge stock has been met by the use of straightrun middle distillate, there is scarcely any straightrun distillate left for incorporation into A.S.T.M. No. 2, 3, and 4 fuel oils. Thus, the approximate composition of the distillate fuel oils (all varieties) and residual oils from prototype refineries have been (W. M. Holaday, Pet. Refiner, Sept. 1950, p. 77):

Year	Distillates composition, per cent			Residual Composition, per cent	
	Straightrun	Thermal	Catalytic	Straightrun	Thermal
1914	100			100	
1935	55	45		30	70
1947	30	30	40	23	77
1950	25	10	65	15	85

Difficulties with instability of color and the formation of gum or sediments, in cracked distillate fuels have persisted all these years. Originally the thermally cracked distillates were treated with sulfuric acid or filtered through fuller's earth to obtain stability but such treatments are expensive and are probably not used at all today. One might expect catalytic distillate to be more stable than thermal distillates but numerous references indicate a lesser stability or at least a degree of instability that is troublesome. Possibly the thermal distillates have a greater ability to dissolve gum-like deposits that are contained in the fuel. Instability seems to be aggravated by the addition of straightrun distillate. The No. 2 distillates are so cheap that instability will probably continue to be a problem unless effective cheap fuel-oil additives can be developed. Several excellent additives have been marketed but they have not completely solved the difficulty of instability. Thus, it is necessary for the marketer to insure that his deliveries are not stored for long periods of time.

The cracked distillates have lower characterization factors than the straightrun distillates. Thus, for a fixed boiling range, the A.P.I. gravity of the cracked distillates is lower, and the heating value is correspondingly higher (on a volume or gallon basis). The characterization factors and diesel indexes of catalytic cycle stocks (distillates) as a function of the properties of the feed stock and the degree of cracking, was completely explored in the December 14, 1953 (p. 157) issue of this page (Properties of Catalytic Cycle Stocks).

The diesel indexes (or cetane numbers) of catalytic cycle stocks are usually too low for current diesel-fuel specifications but such specifications are being gradually relaxed. Pour point is vitally important *(Questions on Technology, Pour Point of Distillate or Diesel Fuels, January 18, 1954, p. 117)*, and contrary to common belief the pour point of cracked materials is not significantly lower than the pour points of similar straightrun distillates. The belief that cracked fuels have low pour points probably arises because the cracked fuels often have lower boiling ranges (and therefore lower pour points) than conventional straightrun fuels.

As little as 2 mg. of insoluble material (gum) per 100 ml. of sample, can cause clogging in the average filter of a burner oil system. Occasionally fuel oils that have been stored for only 2 months cause rapid clogging of the filter. The (preformed) insoluble gum can be obtained by filtration through a sintered glass Gooch crucible (Pyrex No. 32960, fine porosity). The crucible is then washed with A.S.T.M. naphtha and oven dried to constant weight. Little statistical information on gum content is available, but straightrun fuels are usually satisfactory and thermally cracked fuels are satisfactory if they are treated with sulfuric acid, neutralized, and redistilled. The rate of gum formation can be greatly delayed in catalytic fuels by the use of inhibitors such as those of E. I. du Pont de Nemours, Shell Chemical Co., etc. The stability of some catalytic fuels can be improved by washing with caustic soda.

Why Water-Caused Explosions are Violent

"Why are refinery superintendents always so concerned about water in the processing charge stocks?" S.P.C.

Although the lay public always associates explosions with the burning of an inflammable material, probably the most violent explosions in refineries are those caused by the introduction of water into hot oils. The volume of gas that is created during combustion and by water, clearly indicates why the water explosions are so severe.

When 1 cu. ft. of (liquid) water is introduced into a mass of hot oil, the volume occupied by the vapors (at 40 psia. and 620° F.) is about 1,000 cu. ft. The burning of hydrocarbon vapor with 1 cu. ft. of air would result in a volume of less than 4 cu. ft. (2,000° F.) and very much less if the combustion resulted in oxidized hydrocarbons rather than carbon dioxide and water vapor. In most instances, the air would not burn in the normal sense because the very large excess of hydrocarbon vapor would result in a mixture too rich to burn.

Designers always try to avoid water pockets by removing streams from the bottom of towers or vessels rather than the side, and cracking-plant operators always carefully watch to see that no water accumulates in recycle or charge tanks.

Main Compressor Headers

Natural Gas Storage Company of Illinois Compressor Station, Herscher, Ill.

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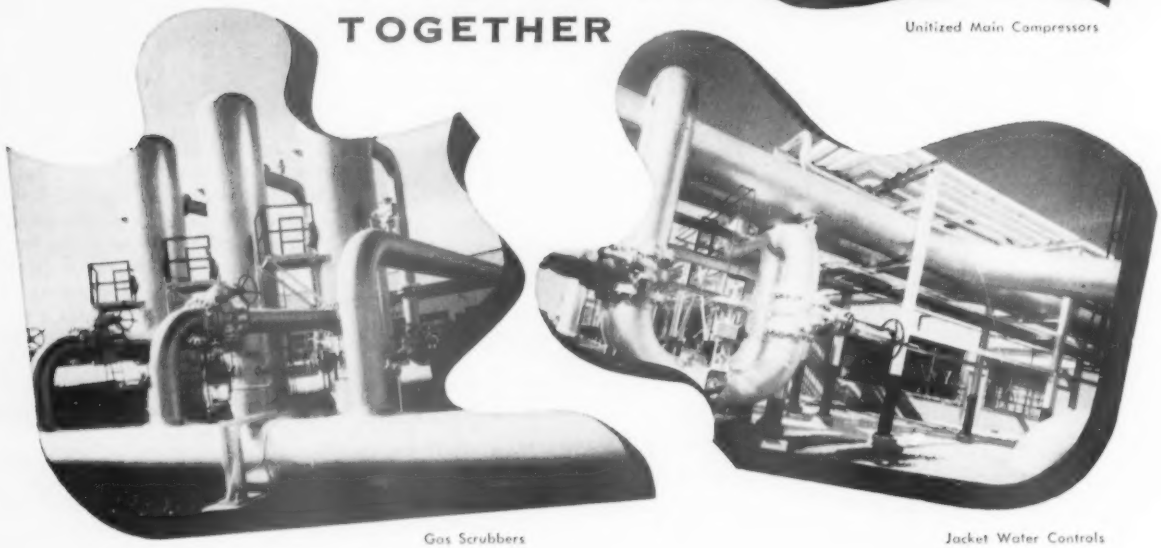

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Applying Lube-Oil Additives—3

by W. D. Thomas

DETERGENTS are widely used in internal-combustion engines for maintaining cleanliness. Although originally developed for diesel lubricants, they have found widespread use in motor oils for passenger cars, buses, trucks, and heavy-duty mobile and stationary equipment. They are used at varying concentrations, depending upon the service required of the lubricant, ranging from about 1 per cent for moderate duty up to approximately 15 per cent where conditions are most severe.

During the early forties when wider use of detergent oils was made, the problem of foaming increased. Tight foams resulted when some detergent-base oil blends were used in engines. The loss of the crankcase change of lubricant through the breather tube would result if left unchecked. Silicone oils were found to be exceedingly effective at very small concentrations, usually a few parts per million. The silicone oil is insoluble in petroleum base oils and its dispersion is effective by virtue of its ability to coalesce the bubble film. They are widely used in the modern detergent oils.

Rust preventives are used in crankcase preservative oils and in some factory initial fills. The compounds are polar in nature, which is necessary to insure adhesion to metal surfaces. Metallic soaps, esters, ethers, and derivatives of dibasic acids have been applied as rust preventives. They have not been used widely in service-station motor oils as such; however, some petroleum sulfonates used as detergents also impart rust-inhibiting characteristics.

In the foregoing we have discussed the individual additives and the factors which influenced their development. Before discussing modern motor oils and their formulations it will be well to trace the very rapid growth of additive application from 1945 to the present.

Author is with American Cyanamid Co. From paper presented at W.P.R.A. meeting.

Shortly after the close of the war additive oils became available to the public for passenger cars on an increased scale. At that time the American Petroleum Institute classified the grades as shown in Table 1.

TABLE 1—A.P.I. CLASSIFICATION OF MOTOR OILS

Type—Additive—	Approximate additive concentration (per cent)
Regular—None	
Premium—Inhibitor	0.5 to 2.0
Heavy duty—Inhibitor and detergent	2.0 to 4.0

At the start of this period regular and premium oils were generally used for passenger cars while the heavy-duty type was used for trucks and buses. This relatively simple classification has been outmoded by a rather rapid sequence of events.

The heavy-duty oil as we knew it at the close of the war which was in general similar to the Army's 2-104B all-purpose motor oil was found to have some limitations when used in new applications. Supercharged diesel equipment required higher-detergency-level oils. The lack of premium diesel fuels led to the use of stocks of high sulfur content. Lubricants of high detergency level and possessing alkaline reserve were developed to reduce the deposits and wear caused by the of the high-sulfur fuel. Caterpillar Tractor Co. Series II lubricants were developed to meet the demands imposed by operating supercharged equipment with high-sulfur fuel and were the first so-called "high additive" oils used using up to about 20 per cent of addition agents.[1]

Supplement I oils . . . Operating conditions which were more severe than previously encountered led to the development of Supplement I oils. Truck transportation increased after the war with the trend toward longer hauls and heavier loads. Supplement I (Supplement 2-104B specs.) oils, which contain a higher detergent content than 2-104B but less than Series II met the more rigid requirements.

In 1950 the Army 2-104B specification was superseded by Specification MIL-O-2104 (Ord) which required that the motor oil be increased to a level between 2-104B and Supplement I.

Thus in a short period we have seen the regular-premium-heavy duty classification become outmoded and the number of oils grow to the number indicated in Fig. 1.

Reference

1. "Series II Oils Pay Their Way," W. C. Brown, F. A. M. Buck, J. A. Edgar, F. E. Kronenberg and J. M. Plantfever, S. A. E. annual meeting, Jan. 8-12, 1951.

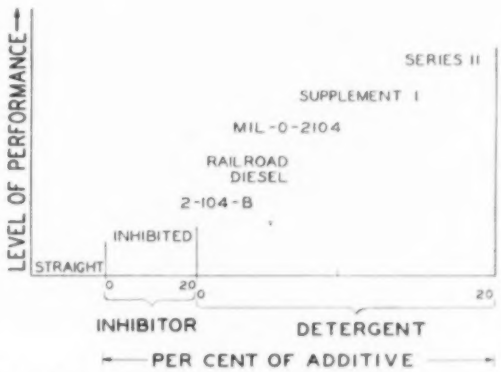


Fig. 1—Approximate additive concentration to meet the levels of performance for lubricating oils.

EQUIPMENT MEN . . . in the News

Dearborn Chemical Forms New Pipe-Line Division

R. A. Carr, president of Dearborn Chemical Co., Chicago, has announced the organization of a new pipe-line sales and service division. R. F. Carr, vice president, will head up the new division and Paul B. Payne, former manager of the Indianapolis office, has been appointed sales manager.

R. A. CARR R. F. CARR

To keep pace with developments in the pipe-line industry, Dearborn is reorganizing and strengthening its technical field service. Carl B. Smith, long associated with Dearborn's activities in the pipe-line and utilities fields, will serve as the new division's technical service manager. The technical service department will handle product development and field service in matters dealing with transmission-systems coating materials.

Regional sales offices have been set up in Dallas; Denver; Detroit; Linden, N. J.; Los Angeles; Nashville; and Pittsburgh, with J. M. Haltom, W. H. Schultz, W. A. Lutsch, V. D. Robinson, W. R. Wieschendorff, G. E. MacLean, and P. L. Knott as regional sales managers, respectively.

Baker Names Turner As Rocky Mountain Manager

R. L. TURNER

Baker Oil Tools, Inc., has announced the appointment of R. L. (Dick) Turner as district manager of its Rocky Mountain district. Headquarters will be in Denver.

Baker's Rocky Mountain district includes sales and service branches in Sterling, Colo.; Casper, Newcastle, and Worland, Wyo.; Glendive, Mont.; Williston, N. D.; and Vernal, Utah.

Turner first joined the Baker organization in Houston in 1934, and has continued with the company ever since, except for 3 years of military service. He has been in Baker's Los Angeles headquarters office since his return from military service in 1945.

Concurrent with announcement of its new district headquarters in Denver, Baker also announced the appointment of J. E. Meador as district sales engineer for the Rocky Mountain district, with headquarters in Casper.

Bearing Company Merges With Parkersburg

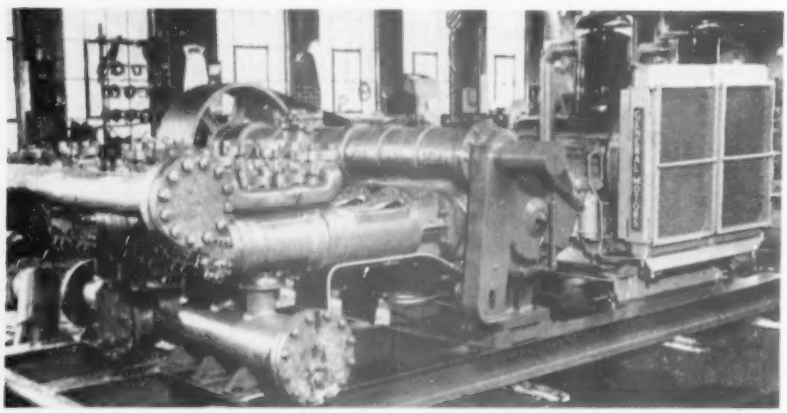
The merger of Parkersburg Rig & Reel Co. and Aetna Ball & Roller Bearing Co., Chicago, approved at special stockholder meetings in mid-January, was made effective February 1, and the combined operation formally took Parkersburg-Aetna Corp. as its new name.

The business of the two concerns will be conducted as divisions of the West Virginia corporation. Parkersburg Rig & Reel, established in 1897, manufactures equipment used in the production, processing, and storage of petroleum products. Aetna manufactures ball and roller bearings and related products.

A. Sidney Knowles, formerly chairman and president of Parkersburg, will be chairman of the board of the merged corporation, and William A. Wood, Aetna president and treasurer, will hold the same offices in the organization. Knowles and Wood will be the chief executive officers of the merged corporation.

Additional officers include: W. V. Rathbone, vice president; J. J. Rozner, vice president; A. G. Evans-Lombe, vice president; Paul O. Summers, secretary; E. A. Johnson, assistant secretary and assistant treasurer; and Harold N. Wilson, assistant treasurer.

Wheatley Pump Ready for Duty in Mexico



The first of several specially designed pipe-line pumps, ordered by Petroleos Mexicanos, of Mexico, as a result of contacts made at the International Petroleum Exposition last May, awaits shipment in Frank Wheatley Pump & Valve Manufacturers' plant in Tulsa. The unit, especially designed for the type of crude oil to be pumped, consists of a Wheatley quintuplex double-acting pump and a General Motors twin 6-71 diesel engine. The initial installation is to be supervised personally in Mexico by Orbie Sumner, Wheatley service manager.

Hughes Named to Manning & Nance and M & R Specialty

H. HUGHES

M. Bink Manning, president of Manning & Nance, Inc., and M & R Specialty Co., Houston, has announced the appointment of Hayden Hughes to an executive position in both companies.

Hughes was employed by Phillips Petroleum Co. in 1933 as a petroleum engineer, and worked up to the position of chief petroleum engineer in 1940. During World War II, he was assistant chief mechanical engineer with Phillips' defense-plant division, working on the design, construction, and operation of a butadiene plant.

He left Phillips to become chief petroleum engineer in charge of Peruvian operations for International Petroleum

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Stand lifts, holds, tilts 55 gal. barrels Prevents spillage—easily loaded.

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Wheeling, West Virginia
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(affiliate of Standard of New Jersey). In 1950, Hughes was made field manager of International's Peruvian operations in charge of exploration, drilling, and production. In 1952 he was made producing advisor of all International Petroleum's operations with headquarters in Coral Gables, Fla. In 1953 he returned to South America as assistant general manager of International Petroleum (Colombiana) Ltd., and as a director of Esso Colombiana and Colombiana de Gas. This position he held until his resignation.

Fram Corporation Buys Warner Lewis Company

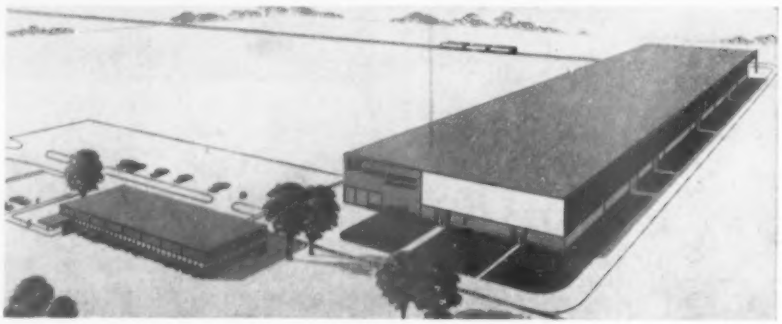
Steven B. Wilson, chairman of the board and president of Fram Corp., Providence, R. I., has announced the purchase of Warner Lewis Co., of Tulsa. The newly purchased company will be known as Warner Lewis Co., division of Fram Corp., and will continue operations at its Tulsa headquarters.

Fram thus acquires a wholly owned subsidiary company, specializing in liquid fuel separators, filters, and meter calibrating tanks, with an already-established sales organization for these products.

Terms of the purchase give Fram all production facilities, buildings, land, and other assets of Warner Lewis through an exchange of authorized-but-unissued shares of Fram stock for all the outstanding stock of Warner Lewis. The amount of unexchanged shares of both companies was not disclosed.

Putting his signature on final agreement papers when Fram Corp. purchased Warner Lewis Co., is Steven B. Wilson, Fram chairman of the board and president. Seated at right is Warner Lewis, president of the company that bears his name. Others watching are: John C. Thom, Fram vice president in charge of subsidiary companies; E. Everett Wilkins, vice president and general counsel of Fram; William B. Franke, senior member of Franke, Hannon & Withey, of New York, Fram's accountants; Fenelon Boesche, Tulsa attorney for Warner Lewis; J. N. Fitzgerald, vice president of Warner Lewis; and Arthur F. Pettet, Fram vice president and general manager.

National's Gainesville Plant Set for 1954 Finish



Here's an advance sketch, based on the architect's drawing, of the $3,700,000 plant which National Supply Co. is building on a 96-acre site near Gainesville, Tex. At right is the manufacturing building, a single-story steel structure, faced partly in brick and partly with aluminum sheathing. The building contains more than 100,000 sq. ft. of space. At left is the single-story office building, also of steel construction, faced in brick. Scheduled for completion late in 1954, the plant will be the seventh for National Supply, manufacturer and distributor of oil-field machinery and equipment. Giffels & Vallet, Inc., L. Rossetti, Detroit, are the architects. Brown & Root, Inc., Houston are the contractors.

Westinghouse Air Brake Forms Export Firm

G. P. GREGORY

The formation of a new international company to expand Westinghouse Air Brake Co.'s product line overseas has been announced by Edward O. Boshell, board chairman and president of Westinghouse Air Brake.

The president of the new company will be George P. Gregory, Jr., New York exporter, whose company handles oil-field, pipe-line, and industrial business in all areas of the world.

In making the announcement, Boshell said, "The company's program, initiated in 1951 to broaden both its line of products and markets, has resulted in increased export sales activities in the expanded product line, which makes it necessary to establish an organization to coordinate and promote the export sales of all the divisions and subsidiaries."

The new company's name will be Westinghouse Air Brake International Co., a Delaware corporation, with offices at 30 Rockefeller Plaza, New York.

In 1924, Gregory was employed by Crane Co., Oklahoma City, as field representative, and later as its sales manager in New York. He organized his own export business as George P. Gregory in 1944 and incorporated his business in 1948.

The business of the foreign subsidiaries and affiliates of Westinghouse Air Brake, which has plants in six European countries and Australia, and the Canadian sales of the Air Brake division, and George E. Failing Co. are not included in the new international company.

Bethlehem Names Honeycutt To Succeed Mackall

E. G. Grace, chairman of Bethlehem Steel Co., Inc., has announced that Paul Mackall, vice president in charge of sales, has retired. He will be succeeded by J. V. Honeycutt, who has been assistant vice president.

E. G. GRACE

HONEYCUTT

Honeycutt has been assistant vice president since 1936. He has been with Bethlehem since 1914, when he began in the open-hearth department. He became supervisor of piece rates in the Bethlehem and Steelton plants. In 1918 he transferred to sales department. He has represented the company at its sales offices in Philadelphia, New Orleans, Atlanta, and New York. Subsequently he was manager of frog and switch sales at the company's headquarters offices in Bethlehem. He became assistant general manager of sales in 1934.

Mackall joined Bethlehem in 1907 upon graduation from Lehigh University with a degree in mechanical engineering. He became manager of sales at Chicago in 1907, and at St. Louis in 1915. He became western sales manager in 1916, general manager of sales in 1925, and vice president in 1928. He was elected a director of Bethlehem Steel Corp. in 1932.

Bullard Names Polizoto To Los Angeles Office

J. L. POLIZOTO

E. W. Bullard, president of E. D. Bullard, Co., San Francisco, has announced that Joseph L. Polizoto has been appointed manager of the firm's Los Angeles office.

Polizoto has been associated with the company since 1934, where he started in the shipping department. He was made assistant manager of the Los Angeles office in 1942. His appointment as manager becomes effective immediately.

E. D. Bullard Co., founded in 1898, is a manufacturer of industrial safety equipment. The company pioneered industrial head protection, web safety belts, safety hooks, and many other items designed to save lives and prevent industrial accidents.

Morgan Is General Sales Manager of Falcon Products

Falcon Products, Pomona, Calif., manufacturers of oil-well slush-pump parts, has announced the appointment of O. W. (Ox) Morgan as general sales manager.

Morgan comes to Falcon with a long career in sales and field service. After majoring in engineering at Stanford University, he joined Byron Jackson Co., with which he served 16 years as oil-field representative in California and the Mid-Continent. During these years at Byron Jackson, he advanced to the position of export and general sales manager of the oil-tool division. Prior to his new position with Falcon, he spent several years as sales manager for Oil Well Manufacturing Co.

H. C. OTIS, JR.

L. M. WILHOIT H. B. SCHRAMM C. M. SCHWAB

Promotion of these four men to top executive positions was announced by Otis on the firm's twenty-sixth anniversary.

Otis Promotes Four Executives

Otis Pressure Control, Inc., Dallas, begins its twenty-sixth year of specialized pressure-control operations this month with the announcement of four new executive appointments.

Herbert C. Otis, Jr., has been named executive vice president of Otis Pressure Control and of its manufacturing affiliate, Otis Engineering Corp. Lowell M. Wilhoit is now vice president in charge of sales and service, and Harry B. Schramm is vice president in charge of engineering and manufacturing. Carl M. Schwab has been named chief engineer.

H. C. Otis, founder of the company, continues as its president. From a modest beginning 25 years ago, with little capital and a lot of good ideas coupled with experience as a mining engineer, Otis has advanced his organization to one of the foremost specialized pressure-control organizations in the world.

Herbert C. Otis, Jr., joined the firm in 1949 after he was graduated from Southern Methodist University. After working in the field with the company's well-service units, he joined the home office staff in Dallas as vice president.

Wilhoit has spent his entire engineering career with Otis, after being graduated from Oklahoma A. & M. in 1936. He worked as a field engineer for Otis in Houston, Corpus Christi, and Oklahoma City. In 1938 he became district superintendent at New Iberia, La. Subsequently, he was promoted to assistant chief engineer in Dallas, chief engineer, and general superintendent and sales manager. During an expansion program that doubled the size of Otis' office and plant facilities, Wilhoit was assigned as production manager for the manufacturing company.

Schramm was graduated from Texas A. & M. College as a petroleum engineer. In 1946 he joined Otis as a field engineer, later becoming chief engineer of Otis Engineering Corp., and manager of the engineering department. He has done extensive development work on Otis safety valves, widely used in high-pressure oil and gas wells, and has been active in the design of many Otis tools now in use by the industry. Schramm was Otis' representative during the development period of Humble Oil & Refining Co.'s permanent well-completion process.

Schwab was graduated from University of Minnesota as a civil engineer. He joined Otis in 1949 in its oil-well calipering department in Houston, later being transferred to New Iberia as division manager, then to Dallas as administrative manager and liaison director for the home office.

Otis has 17 branch offices throughout the oil-producing areas of the Mid-Continent and Gulf Coast regions, and licensed dealers and affiliated companies for its tools and services throughout the United States, and in Canada and South America.

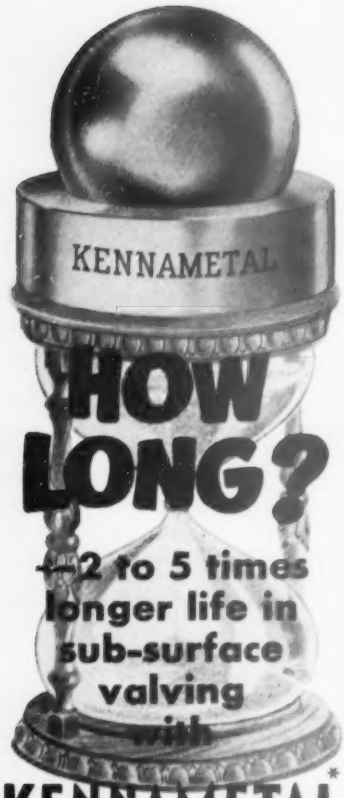
Butler Stresses Old Time Selling at Sales Conference

The return to old-time selling was stressed to 200 salesmen and officials of Butler Manufacturing Co. at a 3-day general sales conference last week at Excelsior Springs, Mo., according to Glen C. Speakman, Butler vice president in charge of sales.

Highlighting the conclave was the revelation of four new steel products, and a Products Revue, employing professional actors and 20,000 sq. ft. of floor space in Kansas City's Muncipal Auditorium.

Butler personnel representing all the factories and sales offices in the United States and Canada attended the meetings, dealing mostly with sales goals for 1954.

The 53-year-old Kansas City company manufactures steel buildings and steel products for the oil industry.



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*Registered Trade Mark

Pipe-Line Patrol

Helicopter View of Construction

THE advantage of watching construction operations from a helicopter is indicated by the photograph taken from the helicopter of H. C. Price Co.—the first helicopter put in regular service in connection with the supervision of pipeline spreads. The status of progress of all the gangs in a spread may readily be observed by superintendents in flying at an altitude of 300 ft. and in hovering whenever it is desirable. The view shows Price operations on a section of Gulf Interstate Gas Co.'s trunk line near Scottsville, Ky.

For preliminary reconnaissance of pipe-line routes, helicopters have been widely used in recent years.

A news article on Gulf Interstate organization appeared in the Journal's issue of January 18, page 50.

Under Way, Contracted, and Planned . . .

PIPE-LINE activity as reported below by The Oil and Gas Journal is compiled from information received from pipe-line companies and contracting firms.

These projects include those planned, proposed, under way, and contracted. Uncontracted projects are indicated by a • preceding the company name.

Crude-Oil Pipe Lines

• **California - Oregon Pipe Line System**—103 miles 6-in., proposed, Crescent City, Calif., to Medford, Ore.

• **Cities Service Pipe Line Co.**—60 miles, 12-in., begin March 1954, Houston to Sour Lake, Tex.

Gulf Refining Co.—63 miles, 8-10-in., under way, Lea County, New Mexico, to Anderson and Denton fields. 1-54.

Magnolia Pipe Line Co.—56 miles, 8-in., contracted, Seminole, Tex., to Gladiola Junction, N. M. Completion date 2-54.

• **Michi, Inc.**—222 miles, 10-in., planned, Highland, Ind., to Kalamazoo, Alma, and Elsie, Mich.

• **Pasotex Pipe Line Co.**—146 miles, 10-in., under way, Snyder to Wink, Tex. 2-1-54.

Phillips Pipe Line Co.—18 miles, under way, gathering lines, northeast area of Andrews County, Texas.

• **Progress Pacific Pipeline Co.**—1,100 miles, 24-in., planned, Odessa, Tex., to Los Angeles, Harbor, Calif.

• **Roosevelt Oil & Refining Corp.**—22 miles, 4 and 6-in., planned St. Helen to Norwich, Mich.

• **Sinclair Pipe Line Co.**—20 miles, 12-16-in., planned, Monee to Blue Island, Ill. Completion date 4-54.

• **Sioux Pipe Line System.**—Under study by Shell Pipe Line Corp. for group of 12 Williston basin producers. Length of line, pipe size, and terminal point pending final report by Shell.

Texas New Mexico Pipe Line Co.—52 miles, 10-in., under way, Dawson County to Basin System. McVean & Barlow.

Texas Pipe Line Co.—65 miles, 4-6-8-12-in.,

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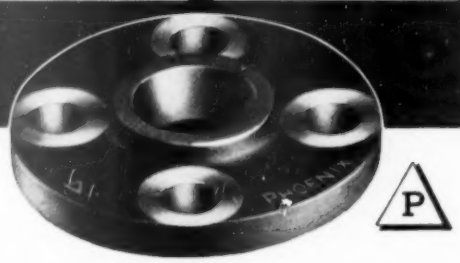
PHOENIX *Drop-Forged* FLANGES MEAN...

MAXIMUM STRENGTH



Long life is assured with Phoenix maximum strength flanges. Forged of mild steel, they are available in a wide range of styles and sizes. Meet ASA requirements and ASME and ASTM specifications.

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PHOENIX MANUFACTURING CO.
Catasauqua, Pa. • Joliet, Ill.

AIR POLLUTION

What happens to smoke from a stack?

How the applied knowledge of windspeed and direction, temperature and humidity can help minimize air pollution problems without costly modification of present equipment.

To find out what happens to smoke from a stack . . . you first build a tower, let's say, 400 feet into the air. Inside that tower put up a smoke stack some 350 feet high. Install Bendix-Friez Recording Aerovanes at regular intervals from top to bottom. Six or seven in all in the stack.

Then let oil fog smoke escape from ports in the stack near the recording Aerovanes. One day release the smoke from high in the stack . . . then low . . . then from the middle, etc. Next day repeat.

Smoke reaction

Study the smoke reaction day in and day out, from sunup to sundown. Graph the recordings of windspeed and direction and the temperatures each time. Chart the smoke dispersion. Keep this up for some four and a fraction years.

If you do this . . . you'll come up with some solid answers for forecasting smoke behaviour under almost all kinds of turbulence and temperature conditions.

Applicable to all industry

Actually, you don't have to go through all this. Meteorologists using Friez equipment have already done much of the work for you. They've established that basic patterns of smoke behaviour can be determined.

At Bendix-Friez we offer you the experience of those who've made use of Bendix-Friez equipment to eliminate their own problem of pollution.

How to do it

For further information, and case histories that apply to your plant and your problem, write to "Air Pollution" Bendix-Friez, Towson 4, Maryland.

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under way, South Louisiana. Panama-Williams.

Golden Meadow to Houma, La. Panama-Williams.

Gathering lines in Leeville, Bay De Chene and Golden Meadow pools. Panama-Williams.

• **West Coast Pipeline Co.**—960 miles, 20-22-in., planned. Wink, Tex., to Norwalk, Calif.

Products Pipe Lines

Badger Pipe Line Co.—215 miles, 8-10-12-in., begin Spring '54, East Chicago, Ind., to Madison, Wis. (Joint project of Cities Service Oil Co., Sinclair Pipe Line Co., Pure Oil Co., and The Texas Co.)

• **H. W. Bass & Sons, Inc.**—152 miles, 4-6-in., proposed. Duval and Live Oak counties, Texas, to Corpus Christi, Tex.

Frontier Ref. Co.—6-in., planned, Cheyenne, Wyo., to North Platte, Neb.

• **Great Lakes Pipe Line Co.**—Planned, extension 130 miles, 8-in., Nebraska City to Grand Island, Neb.

Harbor Products Systems—86 miles, 16-in., under way, Woodbury Junction, Philadelphia to Trembley Point, N. J. Construction Service Co. and H. C. Price Co. (Joint ownership of Sinclair Pipe Line Co., Gulf Refining Co., and Texas Pipe Line Co.) Completion date 1-54.

• **International Pipe Line, Inc.**—132 miles, 8-in., proposed, Wrenshall to Minneapolis, Minn.

Oklahoma Mississippi River Products Line, Inc.—475 miles, 12-in., under way, Duncan, Okla., to West Memphis, Ark. Ford, Bacon & Davis Const. Corp.

Under way, White River to Allen, Okla. River Const. Co. Completion date 6-30-54.

Under way, Allen to Duncan, Okla. River Constr. Corp. Completion date 6-30-54.

• **Phillips Petroleum Co.**—54 miles, 6-in., planned, Goldsmith to Borger, Tex.

52 miles, 10-in., planned, Shell's Brookshire system to Sweeny, Tex.

• **Triangle Pipe Line Co.**—560 miles, proposed, Arkansas City, Ark., to Covington, Ky., and Nashville, Tenn.

U. S. Gov't. Alaskan Products Pipe Line.—600 miles, 8-in., under way, Haines northward through British Columbia and Yukon to Fairbanks, Alaska. Williams Bros., McLaughlin, Inc., and Marwell Const. Co. Completion date 9-55.

• **United States Pipe Line Co.**—1,799 miles, 22-26-in., proposed, Beaumont, Tex., to Newark, N. J.

Beaumont, Tex., to Memphis, Tenn.

Memphis, Tenn., to Louisville, Ky.

Louisville, Ky., to Newark, N. J.

Laterals to Paducah and Lexington, Ky.

Williston Basin Pipe Line Co.—250 miles, 8-in., under way, Laurel-Billings, Mont., refineries to Glendive, Mont.

Wolverine Pipe Line System—200 miles, 14-in., under way, Chicago-Toledo-Detroit. (Joint ownership of Shell, Texas, and Cities Service.) Anderson Bros. and Midwestern Constructors, Inc. Completion date 1-54.

East Chicago, Ind., to Kalamazoo River. Midwestern Constructors, Inc.

Yellowstone Pipe Line Co.—(Continental Oil Co., Interstate Oil Pipe Line Co., Union Oil Co., and H. Earl Clack interest) 540 miles, 10-in., under way, Billings, Mont., to Spokane, Wash. 9-54.

Billings to Bozeman, Mont. Ross and Powers. Comp. July 1954.

Bozeman to Helena and on to Clinton, Mont. Associated Pipe Line Contractors, Inc.

Clinton to Perma, Mont. Associated Pipe Line Contractors, Inc.

Clinton to Perma, Mont. Eastern Pipe Line Fields Service Co.

Perma, Mont., to Murray, Idaho. Eastern Pipe Line Field Service Co.

Murray, Idaho to Spokane, Wash. Engrs. Limited Pipe Line Co.

Natural-Gas Pipe Lines

• **American-Louisiana Pipe Line Co.**—1,121 miles of 30 and 22-in., 30-in., proposed, extends from North Tepetate, Acadia Parish, Louisiana, to near Detroit. The 22-in. starts near Payne, Ohio, extends to Bridgman, Mich. Estimated cost: $130,000,000.

Arkansas-Louisiana Gas Co.—107 miles, 8-24-in., proposed, Arkansas, Louisiana, and Texas.

• **Arkansas-Missouri Power Co.** — 140 miles, 2 to 10-in., planned, St. Francis River, Clay County, Arkansas, to near Campbell, Mo.

• **Associated Natural Gas Co.**—88 miles, proposed, Missouri.

• **Atlantic Seaboard and Virginia Gas** Transmission.—116 miles, 26-in., proposed, loops along Cobb, W. Va., to near Baltimore, Md.

Buzzards Bay Gas Co.—28 miles, 8-in., under way, Hyannis, Mass., to Bourne Bridge, Mass. Hallen Co., Inc. Completion date 2-54.

• **Carolina Natural Gas Corp.**—185 miles, 2-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.

Chicago District Pipe Line Co.—19 miles of 36 and 30-in., completed of 35 miles planned. Remainder, all 30-in., will be completed in 1954.

• **City of Fayette, Ala.**—20 miles, 5-in., proposed, Fayette, Ala., to Southern Natural's system in Tuscaloosa County, Ala.

City of Dallas, Ga.—8 and 4½-in., distribution system. Engineering & Const. Co. 1954.

• **Coast Counties Gas & Electric Co.**—40 miles, 3, 4, and 8-in., planned. Coast and Valley region, California.

• **Colorado Interstate Gas Co.**—365 miles, 22-in., proposed, Green River, Wyo., to Denver, Colo. 1954.

49 miles, 20-in., proposed, Morton County, Kansas, to near Hooker, Okla.

Colorado Interstate Gas Co.—70 miles, 20-4-in., under way, gas-gathering system in Kansas. Engineering & Const. Co. 1-1-54.

243 miles, 4 to 20-in., under way, Colorado, Oklahoma, Texas, and Kansas. Engineering Const. and Z. J. Graham.

• **Cumberland and Allegheny Gas Co.**—31 miles, 12-in., proposed, Garrett County, Md., to Keyser, W. Va.

East Tennessee Natural Gas Co.—96 miles, 16-in., under way, Knoxville, Tenn., to Kent line. Engineering & Const. Co. 1-1-54.

54 miles, 4-12-in., under way, laterals off main line from Knoxville, Tenn., to Kent line. Engineering & Const. Co. 1-1-54.

• **El Paso Natural Gas Co.**—1,178 miles, under way, Permian basin, New Mexico, Texas and Colorado. Spring '54.

El Paso Natural Gas Co.—771 miles, 30-in., under way, Plains, Tex., to Kingman, Ariz.

Section 1—Under way, Plains, Tex., to Corona, N. M. Oklahoma Const. Co.

Section 2—Under way, Corona to Suwanee, N. M. R. H. Fulton.

Section 3—Under way, Suwanee to Gallup, N. M. R. H. Fulton.

Section 4-5—Under way, edge to Navajo Reservation east to Flagstaff on to Kingman, Ariz. Western Pipe Line Const., Inc. Completion date 2-54.

Under way, across Navajo Reservation connecting sections 3, 4, and 5. El Paso Co. crews.

Under way, Spraberry fields, El Paso Co. crews.

• **Fort Worth Basin Gas Co.**—Planned, Novice, through Brown and Comanche counties, Texas.

• **Glacier Gas Co.**—285 miles, 20-in., proposed, Kalispell, Mont., to Spokane, Wash.

120 miles, 16-in., proposed, Spokane to Hanford, Wash.

91 miles, 8⅝-in., proposed, Spokane to Lewiston, Idaho.

130 miles, 12¾-in., proposed, Spokane to International boundary at Trail, British Columbia.

Gulf Interstate Gas Co.—860 miles, 30-in., under way. Acadia Parish, La., to Boyd County, Ky. H. C. Price and Houston Contracting. 11-54.

Under way, Rayne, La., to Kincade, Tenn. Houston Contr. 370 miles laid. 130 miles left to be finished Spring of 1954.

Under way, Gordonsburg, Tenn., to Catlettsburg, Ky. 266 miles completed, 91 miles left.

230 miles, gathering lines, under way. Associated Pipe Line Contractors, Anderson Bros., Williams Bros.

329 miles, 12 to 24-in., proposed. Laterals off Acadia Parish, Louisiana, to Boyd County, Kentucky, line.

• **Home Gas Co.**—32 miles, 12-in., planned, Breesport to Union Center, N. Y.

17 miles, 12-in., proposed, loops from Hansock to Sanford, N. M.

• **Interstate Power Co.**—26 miles, 8-in., proposed, from Nat. Gas P. L. Co. America line near Hooppole, Ill., to Clinton, Iowa. Completed.

Iroquois Gas Corp. and Tennessee Gas Transmission Co.—Companies planning joint storage project to be known as Colden storage field in New York. The following delivery and gathering lines are planned:

17 miles, 16-in. delivery line.

62 miles, 12, 8, 6, and 4-in. gathering lines.

• **Lateral Gas Pipe Line Co.**—27 miles, 4½ in., proposed, from Grant to Clarinda, Ia. Estimated cost: $267,200.

• **Lone Star Gas Co.**—100 miles, proposed, storage fields to the Dallas-Fort Worth area.

35 miles, 12-in., proposed, southeastern Schleicher County.

Lone Star Gas Co.—44 miles, 12-in., under way, Red Springs, Woods County to Sulphur Springs area, Hopkins County, Texas.

• **Manufacturers Gas Light & Heat Co.**—40 miles, proposed, Allegheny, Washington, and Beaver counties, Pennsylvania.

213 miles, 3 to 26-in., proposed, various points on system in Pennsylvania, West Virginia, and Ohio.

72 miles, 16-20-in., proposed, Doddridge, Wetzel and Marshall counties, West Virginia.

• **Michigan Consolidated Gas Co.**—25 miles, 12-in., proposed, from near Sparta to Muskegon, Mich.

• **Michigan-Wisconsin Pipe Line Co.**—251 miles, proposed, 24, 18, 12, 6, and 4-in. loops. Majority will be in Illinois.

Missouri Central Gas Co.—25 miles, 6-in., contracted, Moberly to Macon, Mo. L. R. Young Const. Co.

• **Missouri Public Service Co.**—136 miles, 8-10-in., proposed, New Franklin to Trenton, Mo.

24 miles, 10-in., Johnson County to Clinton, Mo.

• **Natural Gas Producer, Inc.**—100 miles, 12-in., planned, Yenter pool to Denver, Colo.

• **New River Gas Co.**—50 miles, planned, Summers to Monroe counties, West Virginia, to Narrows and Dublin, W. Va.

• **Northern Indiana Fuel & Light Co.**—35 miles, 8-in., planned, Edgerton to Auburn, Ind.

• **Northern Natural Gas Co.**—458 miles, proposed, Kansas, Texas, Oklahoma, and Nebraska, Iowa, and Minnesota to connect with Permian Basin System.

475 miles, proposed branch lines to Iowa, Nebraska, Minnesota and South Dakota.

• **Northwest Alabama Gas District**—40 miles, 9-in., proposed, Southern Natural's line through Windfield to Haleyville, Ala.

• **Northwest Natural Gas Co.**—750 miles, planned, Washington, Oregon, and Idaho.

24-in., Eastport, Idaho, to Monroe, Wash.

18-in., Monroe to International boundary near Lynden, Wash.

22-in., Monroe to near Seattle, Wash.
20-in., Seattle to Portland, Ore.

• **Ohio Fuel Gas Co.**—31 miles, 20-in., planned, Licking County to Richland County, Ohio.

22 miles, 16-in., planned, Dayton, Troy, Piqua, and Sidney, Ohio.

23 miles, 16-20-in., planned, Wellington to Elyria, Ohio; 16 miles, 20-in., planned, Benton Station to Crawford Station; 18 miles, 20-in., Crawford Station to near Columbus; 16 miles, 16-in., planned, Berlin to Sandusky, Ohio.

74 miles, 3 to 20-in., planned, Hocking, Knox, and Ashland counties, Ohio.

47 miles, 20-in., planned, Benton Township, Hocking County, to Columbus, Ohio.

61 miles, planned, northern and southwestern Ohio.

33 miles, 20-in., proposed, Jefferson to Seneca, Ohio.

69 miles, 20-24-in., proposed, lines to tiein Gulf Interstate line along various points in Lawrence, Jackson, Vinton, Hocking and Fairfield counties, Ohio.

Pacific Gas & Electric Co.—200 miles, 34-in., under way, paralleling Topock-Milpitas line. Completion planned in 1954. Engineers Limited Pipe Line Co.

15 miles, 20-in., under way, Helm Junction to Helm Tap, Calif. Alex Robertson Co.

15 miles, 12-in., under way, Herndon to Madera, Calif. Company forces.

13 miles, 16-in., to be completed in 1954 from Fairfield to Napa Wye, Calif. M. G. M. Const. Co.

• **Pacific Northwest Pipeline Corp.**—1,466 miles, proposed, Ignacio, Colo., to Bellingham, Wash.

380 miles, proposed, laterals and spurs off main line to Pocatello, Idaho, to Yakima, Wash.

Permian Basin Pipeline Co.—280 miles, 16-24-26-30-in., under way, West Texas and New Mexico. R. H. Fulton & Co.

• **Rockland Light & Power Co.**—22 miles, 8-in., proposed, Orangetown to Tompkins Cove, N. Y. Canceled.

• **Shenandoah Gas Co.**—39 miles, 3-4-8-in., proposed, Middleton, Va., to Martinsburg, W. Va.

• **South Georgia Natural Gas Co.**—339 miles, 2-12-in., planned, Phoenix, Alta., to Tallahassee, Fla. (a) 12-in., Phoenix, Ala., to Albany, Ga., (b) 10-in., Albany, Ga., to Moultrie, Ga., (c) 8-in., Moultrie, Ga., to Tallahassee.

• **Southeast Alabama Gas District.**—150 miles, 10 and 8-in., planned, Phoenix City to Dothan, Ala. Engineering Const. Co.

Southern California Gas Co., and Southern Counties Gas Co.—73 miles, 30-in., under way, loops on main line from Blythe to Los Angeles. River Const. Co. 1-54.

Southern Natural Gas Co.—1,235 miles, 24 to 4½-in., under way, Louisiana, Mississippi, Albama, and Georgia, and South Carolina. Houston Contracting, Latex and H. C. Price. Fall 1953.

Gwinville to Pickens. Completion in 1954.

Gwinville, Miss., to Ellerslie, Ga. Completion in 1954.

• **Southwest Gas Corp., Ltd.**—26 miles, proposed, from P.G.&E. line to Victorville, Calif.

• **Tennessee Gas Transmission Co.**—571 miles, 30-in., planned, Kinder, La., to Portland, Tenn.

67 miles, 30-in., planned, loops in Texas and Louisiana.

63 miles, 26-in., planned, loops in Ohio and Pennsylvania.

58 miles, 20-in., planned, Louisiana Gulf Coast to Station No. 507 near Kinder, La.

100 miles, laterals in Texas.

45 miles, 20-in., proposed, Buffalo, N. Y., to the U.S.-Canadian border near St. Catherines.

243 miles 24-in., planned, Coudersport, Pa., eastward across Pennsylvania, New Jersey, and New York to point near Greenwich, Conn.

• **Texas Eastern Penn-Jersey Transmission Corp.**—265 miles 24-in., planned, from Oakford Storage field in western Pennsylvania to Texas Eastern Transmission Corp.'s Compressor Station No. 26 near Lambertville, N. J. Estimated cost $30,755,000.

• **Texas Gas Transmission Corp.**—48 miles, 26-in., planned, loops from Memphis to Slaughters, Ky.

• **Texas-Ohio Gas Co.**—1,435 miles, 30-in., proposed, Hidalgo County, Texas, through Arkansas, Mississippi, Tennessee, and Kentucky on to Spencer, W. Va.

• **Transcontinental Gas Pipe Line Corp.**—533 miles, 30-36-in., looping along Texas-New York line.

• **Trans-Northwest Gas, Inc.**—246 miles, proposed, International Boundary near Osoyoos, B. C., to Washington and Idaho.

275 miles, branch lines.

United Gas Fuel Co., and Central Kentucky Natural Gas Co.—57 miles contracted, to Putnam County, West Virginia. H. C. Price Co.

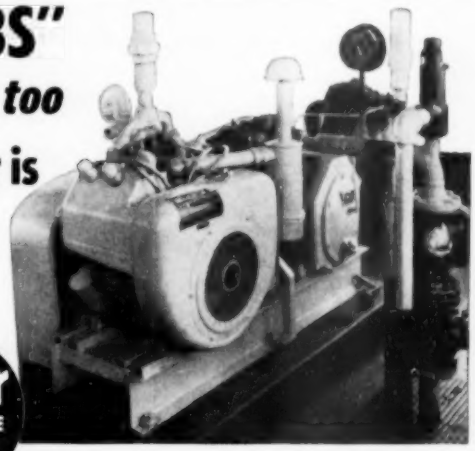
• **United Fuel Gas Co.**—52 miles, 20-24-in., proposed, Wood County to Lanham, W. Va. Spring 1954.

57 miles, 30-in., proposed, Lanham in Kanawha County, West Virginia, to Gulf Interstate line in Boyd County, Kentucky. Spring '54.

United Gas Pipe Line Co.—44 miles, 20-in., under way, Lirette field to Harvey, La., Brown & Root.

• **United Natural Gas Co.**—50 miles, 12-

"INSIDE JOBS"
Are Important, too
This Compressor is
WISCONSIN-
POWERED



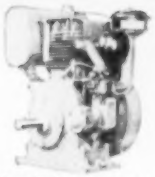
Power TO FIT THE JOB

Power TO FIT THE MACHINE

Typical of the "Inside Jobs" handled by Wisconsin Heavy-Duty Air-Cooled Engines in the oil field is this air-compressor application in a Texas pipe-line pump station.

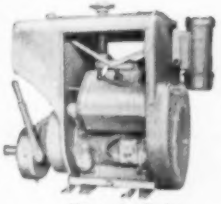
Wherever constant, steady-going power is required, inside or outside, you can depend on Wisconsin Heavy-Duty Air-Cooled Engines to stay on the job and fully meet the power demands of the assignment. Dependable AIR-COOLING makes these engines weather-proof and fool-proof. Heavy-duty design and construction adapt them to the toughest operating conditions. They not only fit the equipment and the job, but they also fit your available fuels . . . gasoline, kerosene, casing-head gas, butane or propane.

You can't do better than to specify "Wisconsin Power" for any equipment requiring anywhere from 3 to 36 hp. — in 4-cycle single cylinder, 2- and 4-cylinder models.



4-cycle Single Cylinder
3 to 9 hp.

2-cylinder
7 to 15 hp.



V-type 4 cylinder
15 to 36 hp.

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World's Largest Builders of Heavy-Duty Air-Cooled Engines

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OIL FIELD DISTRIBUTORS FOR WISCONSIN ENGINES AND ALL TYPES OF UTILITY UNITS.

A-7635-½-I

in., planned, Elk County to Jefferson County, Pennsylvania.

• **Utah Natural Gas Co.**—103 miles, 16-18-in., proposed, Clear Creek field near Price to Salt Lake City, Utah.

18-in., Clear Creek to Provo, Utah.

16-in., Provo to Salt Lake City, Utah.

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Warren Petroleum Co.—54 miles, 4-30-in., homa. Completion date 6-54.

25 miles, 3 to 20-in., Garvin County, Oklaplanned, Lea County, New Mexico.

Westcoast Transmission Co., Ltd. — (See foreign natural gas pipe lines).

Foreign Crude-Oil Pipe Lines

• **Arabian American Oil Co.**—18 miles, 22-20-in., planned, Qatif to Ras Tanura No. 3. Completion date 1-55.

Bombay Port Trust.—50 miles, 8 to 24-in., contracted, Bombay, India, to serve Standard Vacuum Oil Co., and Burmah Shell refineries. Merritt, Chapman & Scott Corp., contractors. (Crude and Products.)

• **Creole Petroleum Corp.**—25 miles, 34-in., planned. Lagunillas to La Salina (State of Zulia, Venezuela.) Completion date 9-54.

Direccion General de Yacimientos Petroliferos Fiscales—409 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

Estrada De Ferro Santos A Jundiai Oleoduto Santos—Sao Paulo.—This Brazilian company has completed or recently started the following lines:

6 miles, 22-in. crude line from Alamoa to Junction. Completed.

2 miles, 24-in. crude line from Junction to Refinery at Capuava. Completion, May 1954.

1 mile, 22-in. from Junction to Cubatao. Completed.

21 miles, 12-in., planned from Cubatao to Capuava refinery. Completion scheduled for June 1954.

8 miles, 18-in., planned from Junction to power plant at Cubatao. Completion set for March 1954.

6 miles, 8-in., products line, planned from Capuava refinery to Utinga. Completion set for March 1954.

• **Gaz de France**—200 miles, 12-in. Ruhr to Paris, France.

• **Interprovincial Pipe Line Co.**—600 miles 24 and 26-in. loops, planned, along Interprovincial system between Edmonton, Alta., and Superior, Wis.

• **Petroleos Mexicanos.**—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

100 miles, planned, Ishthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

72 miles, 12-in., proposed, Poza Rica to Atzacapotzalco, Mexico.

Petroleos Mexicanos.—125 miles, 10-in., under way, Jose Colomo to El Plan, Mexico.

• **Saskatoon Pipe Line, Ltd.**—56 miles, 6-in., planned, Milden to Saskatoon, Sask.

Texas Petroleum Co. — 60 miles, 4-6-in., under way. Pta. Nino de La Dorada.

• **Trans Mountain Oil Pipe Line Co.**—30 miles, planned, Vancouver, B. C., terminal to Ferndale, Wash.

• **Yacimientos Petroliferos Fiscales Bolivianos.**—170 miles, 4-in., planned, Bermejo to Tupiza, Bolivia.

Foreign Products Pipe Lines

Anglo-Iranian Oil Co., Ltd.—18½ miles, 16-in., under way, Little Aden to Aden. Bechtel Corp. Completion date December 1954.

18½ miles, 6-in., under way, Little Aden to Aden. Bechtel Corp. Completion date December 1954.

15 miles, 12-in., under way, Kwinana to Fremantle, M. W. Kellogg Co. Completion date February 1955.

17 miles, 6-in., Kwinana to Fremantle. M. W. Kellogg Co. Completion date February 1955.

• **Empresa Nacional del Petroleo** — 80 miles, 6⅝-in., planned, Concon to Santiago, Chile.

• **Governments of Southern Rhodesia and Portuguese East Africa.**—200 miles, considered, Beria, Portuguese Mozambique to Umtalia, Southern Rhodesia.

North Atlantic Treaty Organization (NATO)—1,920 miles, 4-10-in., to serve military bases in Western Europe (to connect with U. S. Government's St. Nazaire-Paris-Metz line.) Contracted by Soc. Foster Wheeler Francaise.

• **Petroleos Mexicanos.**—124 miles, 6-in., planned, Lagos to Guadalajara, Mexico.

54 miles, 6-in., planned, Lagos to Aguascalientes, Mexico.

82 miles, 8-in., planned, Salamanca to Lagos, Mexico.

• **United States Government.**—375 miles, 12-in., planned, St. Nazaire to Melun and Metz, France.

Foreign Natural-Gas Pipe Lines

Azienda Generale Italiana Petroli — 90 miles, 12-in., under way, Cortemaggiore to Bologna, Italy, SNAM crews.

120 miles, 16-in., under way, Cremona Porto Mar to Ghera, Italy, Montubi, contractor.

40 miles, 12-in., under way, Ripalta-Bergamo, Italy.

Direccion General del Gas del Estado—310 miles, 8-in., under way, Plaza Huincul to Neuquen, Argentina, to the vicinity of General Conesa, Argentina.

• **Empresa Nacional del Petroleo** — 80 miles, 10-in., planned, Concon to Santiago, Chile.

• **Northwest Natural Gas Co.**—950 miles,

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SPECIALISTS
offer
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• Fast Service on anodes.
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You'll save money when you depend on AN-SPEC anode specialists . . . our only business is cathodic protection and our goal is a better and faster service. Our specialized ability is available to help you solve all of your cathodic protection problems.
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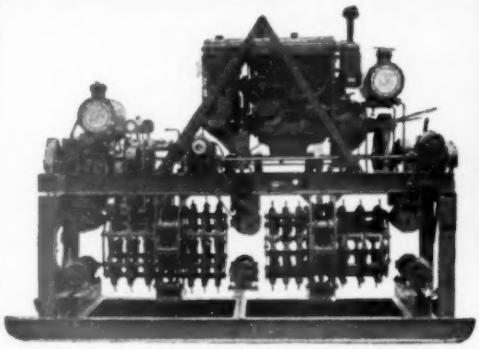
Pipeline Supply Company 812 West 11th Houston, Texas

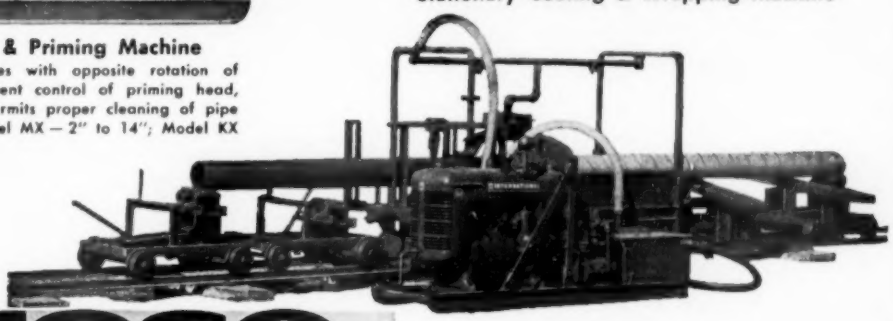
Here's a yard pipe reconditioning setup that will save you money!



Stationary Cleaning & Priming Machine

Has dual head assemblies with opposite rotation of cleaning heads. Independent control of priming head, and pipe input speeds permits proper cleaning of pipe in various conditions. Model MX — 2" to 14"; Model KX — 16" to 26".

Stationary Coating & Wrapping Machine



Designed to process pipe from 2" to 30". Hydraulically driven turn table permits smooth operation. Designed to apply single or multiple coats and wraps to specifications.

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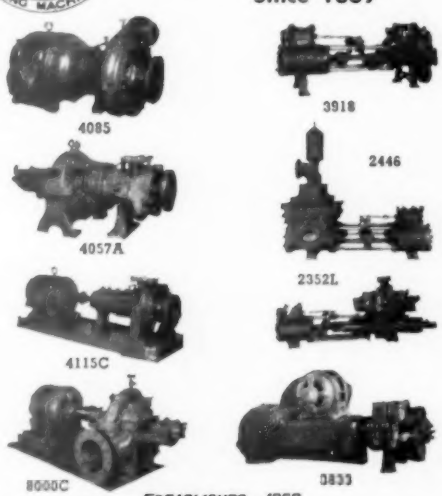
BUILDERS OF OUTSTANDING PUMPS
Since 1869



ESTABLISHED 1869

DEAN BROTHERS PUMPS INC.

INDIANAPOLIS IND.

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Stop Fires before they stop you

Use Ampco* Safety Tools in hazardous locations

Employees do their best work when they know their tools are safe for the job. That's why you're money ahead when you insist on Ampco Safety Tools whenever there's a chance of fire or explosion — in spray booths, paint lockers, inflammable-liquid storage areas, or in the presence of explosive gases or dusts.

Factory Mutual Laboratories and other leading safety authorities know that the use of ordinary tools in hazardous locations often means disaster. That's why they approve and recommend Ampco Safety Tools for these spots.

Play safe! Use long-lasting Ampco Safety Tools. More than 400 different types and sizes. Order Ampco Safety Tools today for lower insurance rates, safer work, and better employee morale.

*Reg. U. S. Pat. Off.

AMPCO METAL INC.

Dept. OG-2
Milwaukee 46, Wis.

AMPCO

West of the Rockies it's Ampco Burbank Plant, Burbank, California. In Canada Safety Supply Co., Toronto, Ontario

T-10A

24-in., planned, Alberta fields to Vancouver, B. C., Seattle, Wash., and Portland, Ore.

Petroleos Mexicanos.—205 miles, 16-in., under way, Monterrey to Torreon, Mexico.

• **Petroleos Mexicanos.**—440 miles, 20-in., planned, Brazil to Tampico to Poza Rica, Mexico.

Societa Nazioanle Metanodotti.—This Italian company has completed or has the following projects under way. All completed jobs were finished January 1954.

53 miles, 16-in., Cremona to Porto Marghera. Montubi, Contractor. Completion May 1954.

72 miles, 16-in., Cortemaggiore to Genova. Montubi, contractor. Completion February 1954.

35 miles, 16-in., Cremona to Busto Arisizio. Sartori-Mereco-Bomar, contractors. Completion April 1954.

23 miles, 10-in., Credera to Torre Boldone. Montubi, contractor. Completed.

12 miles, 10-in., Cavaglia to Ivrea. Sartori, contractor. Completed.

10 miles, 10-in., Cavaglia to Biella. Sartori, contractor. Completed.

15 miles, 8-in., Brogliano to Schio to Piovene Rocchette. Mereco-Siedman, contractor. Completion March 1954.

18 miles, 6-in., Bergamo to S. Giovanni Bianco. Rolle, contractor. Completed.

9 miles, 5-in., Roverbella to Mantova. Rolle, contractor. Completed.

8 miles, 12-in., Correggio to Villa Masone. Mereco-Progresso, contractor. Completed.

20 miles, 8 and 6-in., Val Seriana district. Sartori, contractor. Completed.

20 miles, 7-in., Vedano O. to Laveno. Mereco, contractor. Completed.

• **Trans-Canada Pipe Lines, Ltd., (Canadian Delhi Oil Co.)**—2,247 miles, 14 to 30-in., proposed, Alberta to Toronto to Montreal. 747 miles, 8 to 24-in., gathering system in Alberta.

• **Westcoast Transmission Co., Ltd.**—932 miles, 24-in., planned, Ft. Saint John, B. C., to Spokane, Seattle, and Portland. Ford, Bacon & Davis, Engineers.

138 miles, 20-in., planned, Sumas to Tacoma, Wash.

139 miles, 18-in., planned, Tacoma, Wash., to Portland, Ore.

• **Western Pipe Lines.**—833 miles, 24-in., proposed, from southern Alberta, eastward across the Canadian prairies, serving principal towns and cities along the route.

WHEATLEY'S

OVER 1,000 NOW IN USE!

heap BIG little 3½"X5"

FOR: • OIL • MUD • ACID • SALT WATER • WATER FLOODING

Here's one you won't give back to the Indians! It's terrific for those specialized pumping jobs that have been worrying you. Why invest more money than is necessary for 20 H.P. down to 5 H.P.?

REPLACES 4" x 6" FOR MOST PURPOSES

Piston	Stroke	BPH	PSI	HP	Wt. Lbs.	Plunger Load
2"	5	35	900	15	700	2500#
2½"	5	56	520	15	700	
3"	5	83	350	15	700	
3½"	5	115	255	15	700	

- HERRINGBONE GEARS
- REDUCING LINERS
- POT TYPE FLUID END
- NO ROD OVERLAP
- ANTI-FRICTION BEARINGS
- CONTROLLED LUBRICATION

SAVE $1,000 BY USING 3½"X5" INSTEAD OF 4"X6"

WHEATLEY PUMPING UNITS AVAILABLE THROUGH:

▶ Charles Wheatley Cos. ▶ Franklin Supply Co. ▶ J. & L. Supply Co.
▶ United Supply Mfg. Co. ▶ Walker-Neer Co. ▶ D. T. O'Conner Co.
▶ Wheatley Equipment & Supply, Limited

FRANK WHEATLEY
PUMPS & VALVES
TULSA 6, OKLAHOMA

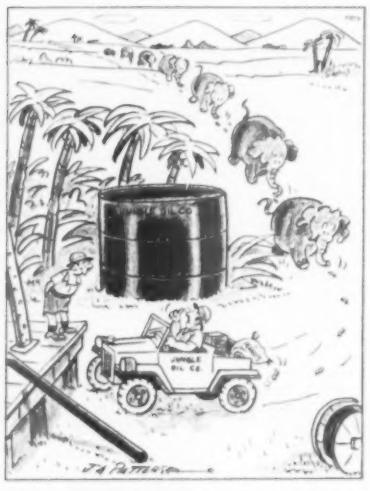
BOOKS

TABLES OF 10^r, NATIONAL BUREAU OF STANDARDS APPLIED MATHEMATICS SERIES 27. Published by the bureau and printed by Government Printing Office, Washington. 543 pp. $3.50.

Although there are a number of handy tables of logarithms to 10 or more places, these tables necessitate the use of inverse interpolation for finding the antilogarithm. Thus, a table of antilogarithms is needed. The present volume gives antilogarithms to the base 10, or 10^r, in the form of two tables a readily interpolable table for 10-decimal accuracy and a basic radix table for 15-figure accuracy. When used in conjunction with logarithmic tables in any extensive computations involving logarithms and antilogarithms, the Tables of 10^r will save considerably more labor than will logarithmic tables used alone.

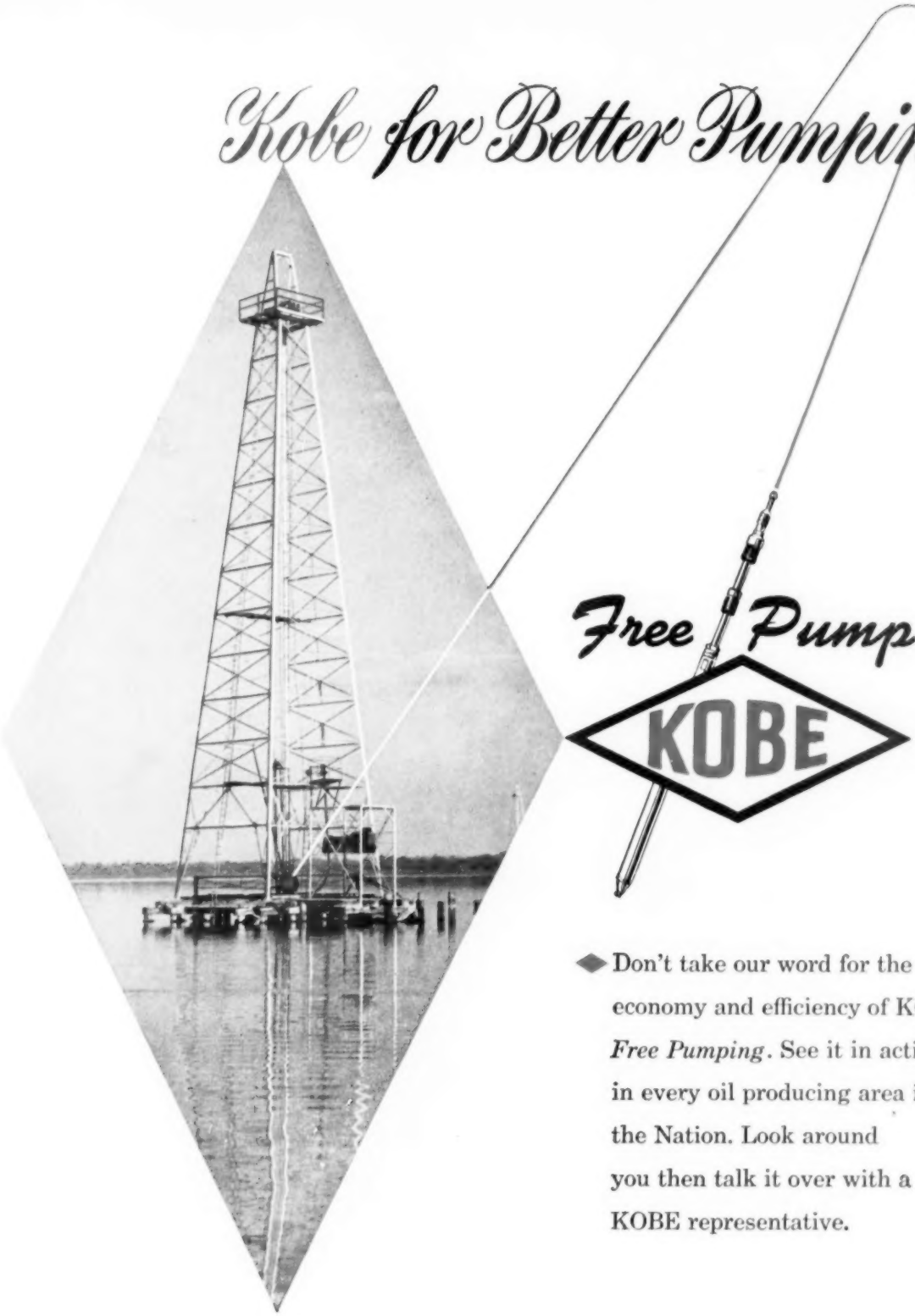
PEI JOURNAL. Published by Petroleum Educational Institute, 9020 Melrose Avenue, Los Angeles.

This is Volume 1, Issue 1, of a publication whose announced purpose is "to cover the fundamentals of new and changing developments, in connection with products information which sales and service personnel will find useful in their daily work." All technical information is presented in A B C language and so illustrated that it is clearly understood by those who do not possess a technical background. The foreword points out that the publication is not in a general sense a magazine, but that it is a "text on the vital subject of products information which is of prime importance to all those engaged in the sale and service of petroleum products."



"No, I didn't forget your sack of peanuts."

Kobe for Better Pumping



Free Pump

KOBE

◆ Don't take our word for the economy and efficiency of KOBE *Free Pumping*. See it in action in every oil producing area in the Nation. Look around you then talk it over with a KOBE representative.

KOBE INC. **Division of Dresser Equipment Co.**

HUNTINGTON PARK, CALIFORNIA • OKLAHOMA CITY, OKLAHOMA

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MANUFACTURING
DIVISION

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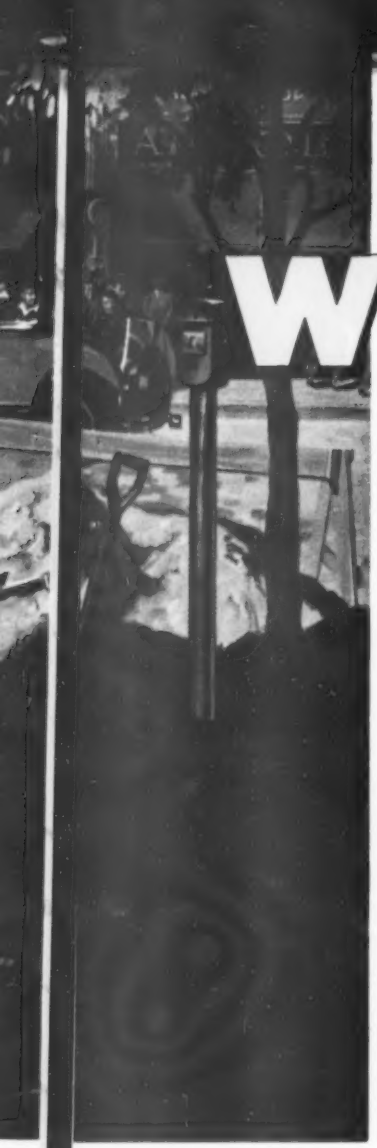
Dresser Manufacturing Division has grown up and expanded with the gas and oil industries. Dresser Couplings, the first leakproof pipe joints, made possible the high pressure transmission of gas over long distances. Dresser's complete line of couplings, repair clamps and sleeves, and welding fittings are specially designed to meet requirements of these industries.

MAGNET COVE BARIUM CORP., Houston, Tex., Malvern, Ark. Magcobar drilling mud, Magcogel bentonite, Mylojel, Fiber Seal, Jel-Oil mud.

CLARK BROS. CO. DIVISION, Olean, New York. Engines and compressors—gas, steam and diesel driven.

DRESSER MANUFACTURING DIVISION, Bradford, Pa. Oil and gas pipe couplings, fittings and sleeves—rolled and welded rings—welded fittings and flanges.

KOBE, INC., DIVISION, Huntington Park, Calif. Complete hydraulic oil field pumping systems, including the Kobe Free Pump.



What is the DRESSER *plus+?*

The Dresser Plus is the extra *service* you get when you deal with any Dresser company. It is an added advantage for you which stems from Dresser's unique overall organization. For Dresser is many companies with a single purpose—to provide the growing oil and gas industries with operating equipment that is *second to none*.

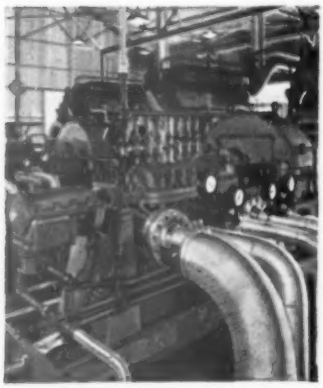
Each company in the Dresser group functions independently within its own specialized field—yet each can draw from the total resources, in manpower, research, and know-how, of the combined Dresser operations. When you work with any of the Dresser companies, all of the facilities of Dresser are *at your service*.

Planned, coordinated specialization—company by company—"one for all and all for one"—that is the DRESSER PLUS +

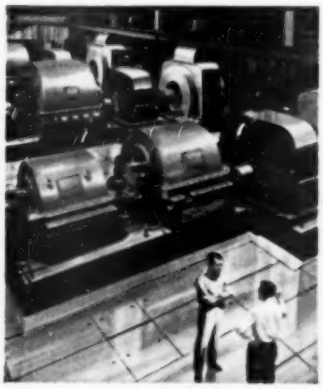
Gas utilities and pipelines use Dresser Products as standard practice in the installation and maintenance of their underground lines. In the oil fields, Dresser Couplings and long sleeves are widely employed on pipelines, field and tank connections, machinery and equipment hookups. DRESSERTAPE is a new plastic coating for the protection of pipe against corrosion.

DRESSER INDUSTRIES, INC.
OIL, GAS AND CHEMICAL EQUIPMENT

ATLANTIC BUILDING ★ DALLAS, TEXAS



PACIFIC PUMPS, INC., Huntington Park, Calif. Centrifugal pumps, deep oilwell plunger pumps, hot oil and boiler feed pumps.

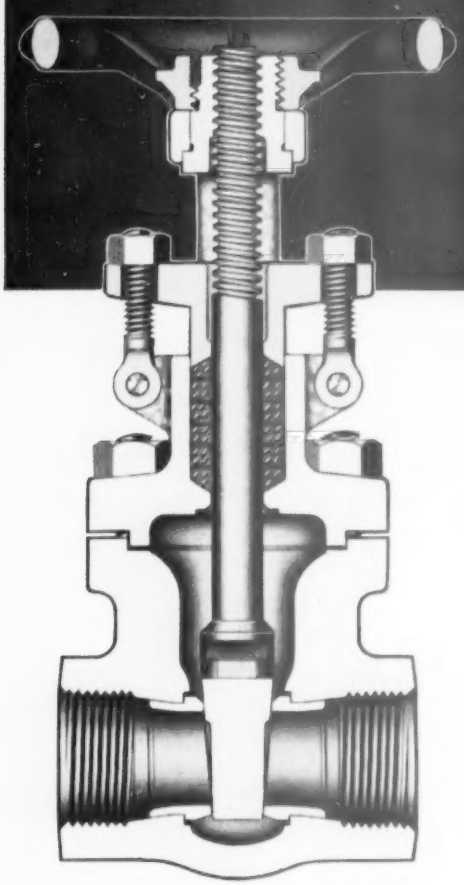


ROOTS-CONNERSVILLE BLOWER DIVISION, Connersville, Ind. Rotary positive blowers, gas pumps, centrifugal blowers, exhausters; positive displacement meters.

SECURITY ENGINEERING DIVISION, Whittier, Calif., Dallas, Tex. Rock bits, reamers, casing scrapers, reamer rock bits, coring bits, Securaloy.

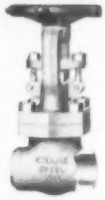
IDECO DIVISION, Dallas, Beaumont, Tex. Derricks, drawworks, rambler drilling rigs, traveling blocks, rotary tables.

You get Big Valve quality in these SMALL 600-POUND STEEL GATES by CRANE



BOLTED BONNET OR UNION BONNET

In the cross-section of the bolted bonnet pattern above, you can see the rugged *big-valve* construction. Bolted bonnet valves available in sizes ½ to 2-inch—union bonnet valves in sizes ¼ to 2-inch.



Screwed Ends—Union Bonnet or Bolted Bonnet

Socket-Welding Ends—Bolted Bonnet or Union Bonnet

Flanged Ends—Bolted Bonnet only

Look no further for dependable steel valves in sizes up to 2-inch. Whether you prefer the union bonnet or bolted bonnet pattern, you get refinements usually found only in larger, more expensive valves.

For example, you get a compact, weight-saving structure of high-quality carbon steel. Smooth operation and positive closure of the solid wedge disc are assured by a T-head disc-stem connection and full-length machined guide ribs. There's also an unusually large stuffing box filled with high-grade packing, a leakproof bonnet joint with retained gasket, a husky stem with outside threads, and many others. To simplify maintenance, Crane design includes swinging gland eye-bolts—plus a wide yoke with liberal working space around the gland.

USER'S CHOICE OF TRIM

There's versatility to these quality Crane steel valves, too. You can have your choice of trim to suit your service—Class X Trim (Exelloy body and body seat rings) for oil or oil vapor—Class XW Trim (Exelloy seat rings, disc of hardened stainless steel) for steam or water. Union bonnet valves also available with Class L Trim (18-8 Mo Alloy seats, disc, stem) for liquids and gases up to 750° F.

Full details in 6-page folder AD-1881. Ask your Crane Representative next time he calls, or write direct.

THE BETTER QUALITY... BIGGER VALUE LINE... IN BRASS, STEEL, IRON

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
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VALVES • FITTINGS • PIPE • PLUMBING • HEATING

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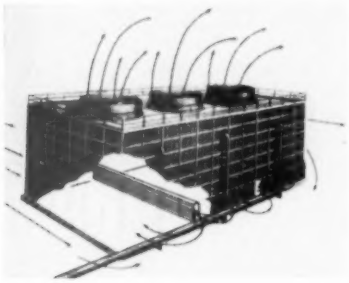
DIGEST OF NEW EQUIPMENT

IT'S NEW ✓ CHECK IT

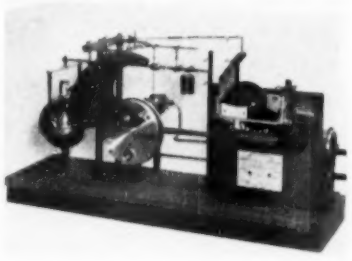
by Dan B. Miller

1 NEW COOLING-TOWER DESIGN. A new engineering and design feature, using equalizing channels between cells of the tower, balances pressure and reduces recirculation. To prevent exhausted air from being forced downward into the inlet area and recirculated through the tower, equalizing channels are introduced into large, multicell towers, which relieves the pressure differential existing between the windward and leeward sides. Pressure is thereby equalized on both sides of the tower, and during the presence of strong horizontal winds, the channels allow air to pass completely through the tower in order to equalize pressure. *Santa Fe Tank & Tower Co.*



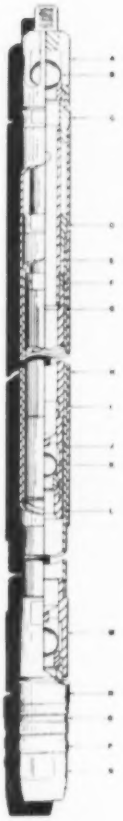
IT'S NEW ✓ CHECK IT

2 ARCCO-ANUBIS METAMETER RECORDING AND TRANSMITTING LIQUID GRAVITOMETER combines the mechanism of the standard Arcco liquid gravitometer with a metameter telemeter transmission system which records and transmits the specific-gravity record to control room or other remote location. Private wires, telephone circuits, carrier channels, or radio may be used as the connection line between transmitter and receiver, and accuracy is unaffected by characteristics of the transmitting circuit or channel. While the total specific gravity range of the standard instrument is 0.15 or larger, the instrument is also available with a range of 0.10, and in some cases can be furnished with ranges as low as 0.05. Specific gravity charts are available for many different gravity ranges. Special degree A.P.I. charts can be furnished at slight additional cost when required. *American Recording Chart Co.*



IT'S NEW ✓ CHECK IT

3 AXELSON TRIAX PUMP. A chromium-plated three-tube pump with traveling barrel is for specific use where there is difficulty with heaving or floating sand. Lower fluid levels in sand formations will greatly increase the use of this pump. The tubes will withstand severe abrasive and corrosive conditions. The new pump is available in three lengths for 2 and 2½-in. tubing. The 12-ft. pump will operate efficiently, under normal conditions, in wells 2,000 ft. in depth, the 15-ft. pump at 3,500 ft., and the 18-ft. pump at 5,000 ft. Maximum stroke length of 51 in. is available in the 12-ft. pump, and 87 in. in the 15-ft. and 18-ft. pumps. All fittings possible have been made with A.P.I. elements, assuring maximum amount of interchangeability. *Axelson Manufacturing Co. Division, Pressed Steel Car Co., Inc.*



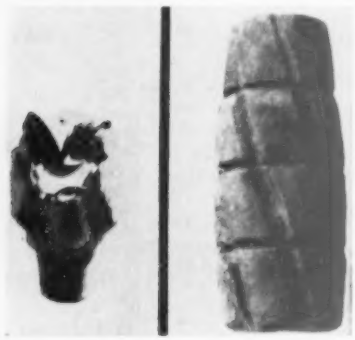
IT'S NEW ✓ CHECK IT

4 REAMER CUTTERS FOR EXTREMELY HARD ABRASIVE FORMATIONS. Remarkable results are being reported from West Texas and New Mexico where the new chert-type reamer cutters are now in use. The new cutters are designed especially for reaming hard abrasive formations such as hard sandy limestone and chert, where rock bits frequently lose gage before their drilling rate is materially reduced. The cutters contain six wide helical rows of teeth, each of which has two longitudinal grooves filled with tungsten carbide hard facing. This feature coupled with the desirable shearing action of the reamer provides maximum life and the most efficient reaming as evidenced

KEEP INFORMED ✓SAVE TIME ✓TEAR OUT CARD ✓CHECK IT ✓MAIL IT

This Digest of New Equipment offers you a quick resume of important features of new or improved products and trade literature and the opportunity to obtain complete information on each subject by use of the convenient "CHECK IT - MAIL IT" service card.

in the accompanying photograph. The reamer cutter (right), one of a set, was run in a Security reamer directly above the bit. The bit (left) was far undergage. However, the hole was so effectively reamed that new bit which followed went to within 2½ in. of the bottom without reaming (distance from bit to reamer cutters). In other instances, the new reamer cutters have been less than ⅛ in. undergage, although the bits have been under as much as 1½ in. *Security Engineering Division, Dresser Operations, Inc.*

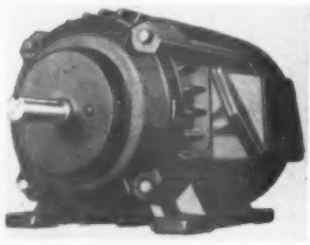


IT'S NEW CHECK IT

5 TEKTOLOG AND THE NULL BALANCE RECORDER. Capable of gathering operating data from 24 separate sources and logging the collective information on a single circular chart, both the Tektolog and Null Balance Recorder will provide accurate measurement for a vast range of industrial process and laboratory applications. These instruments can be directly coupled to tachometers, resistance thermometers, conductivity cells, strain gages, carbon dioxide indicators, or pH meters to produce a permanent record of operating speed, temperature, pH values, or other data. Recording in either instrument is achieved through a six-point turret-pen mechanism which traces six different colors. By dividing the standard circular chart into four equal parts and installing a mechanism to rotate the chart periodically, data from six separate points can be logged in each quarter. A standard synchronous chart drive motor keeps the chart "in time," so that each quarter of the chart may be made to correspond to a 1-hour, 8-hour, 24-hour, or 7-day period. The print cycle is 5 seconds per point and the total cycle for all 24 points is only 2 minutes. A convenient feature never before offered in any other multipoint recorder allows the cycling mechanism to be switched off, permitting the unit to operate as a standard single-point-pen inking recorder. *Fielden Instrument Division, Robertshaw-Fulton Controls Co.*

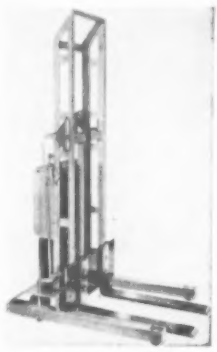
IT'S NEW CHECK IT

6 NEW A.C. MOTORS. A new line of well-protected, squirrel-cage induction motors is being built to recently adopted standards of National Electrical Manufactures Association. The first of the new Reliance motors to appear will be built for 1, 1½, and 2-hp. applications, in frame sizes 182 and 184. The remainder of the line, up to and including 30 hp., will be introduced at regular intervals during 1954. The new totally enclosed fan-cooled motors are built to operate under a wider variety of adverse atmospheric conditions and in any mounting position. *Reliance Electric & Engineering Co.*



IT'S NEW CHECK IT

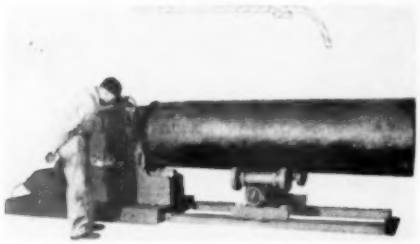
7 ELECTRIC PORTABLE LIFT-TRUCK. This new model, the Safeway Model EL-20 is designed as a "4 to 1" unit. It operates as a fork-lift, straddle-lift, platform-lift, and a drum-stacker with a lifting capacity of 1,250 lb. While this model has been designed as an all-around lift truck, for maximum economy, it includes many features which have proved popular in Safeway's other models, such as: Snap-On Platform, powerful hydraulic cylinder, builtin charger with automatic cutoff key locked ignition switch, and electronic cutoff switch. *Safeway Industrial Equipment Corp.*



IT'S NEW CHECK IT

8 NEW SLING SADDLE. Cast in corrosion-resistant bronze, it is light in weight and easy to install. It can be attached or removed from any wire-rope or braided sling in a few seconds, yet the sling saddle fits tight enough on the rope or sling to prevent its sliding to the bottom when not in use. It can be moved or adjusted easily by hand for various sizes of sheets and plates. The saddle protects the body of the sling from being cut, crushed, kinked, or snarled in handling steel or aluminum sheets and plates. With heavy packages of this metal, the bottom sheets are often damaged by the body of the sling. The sling saddle gives more bearing area, consequently eliminating rejected material. *Newman Manufacturing & Sales Co., Inc.*

9 OFFSET FORMING MACHINES. These machines are used for jogging or offsetting the end of tank shells and pipes for subsequent assembly of welding heads or other shells. The joint thus produced provides an excellent backup for automatic welds and greatly facilitates assembly of the parts involved. The new style turntable illustrated permits rotation of the work, also permits rotating of the work end to end, and movement of work into and out of the machine by means of the car-type turntable with built-in rails and wheels. The machine is now offered in three models, Model M-2, capacity up to ¼ in.; Model M-4, capacity up to ⅜ in., and Model M-5, capacity up to ½ in. *Reed Engineering Co.*

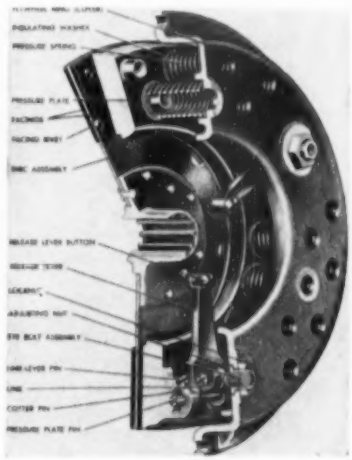


IT'S NEW CHECK IT

10 PESCO GASKETS are molded of glass fiber and a special resin, and provide positive protection against the flow of electric current between dissimilar metals in a joint. They are form fitting under pressure, have high mechanical strength, and are unaffected chemically by any of the gases or fluids encountered in oil and natural-gas production or transmission. When used with insulated sleeves and washers around the bolts, these gaskets will electrically insulate any joint, and will eliminate corrosion caused by galvanic, long line, or stray electric currents. They are widely used to insulate well structures against currents flowing from pipeline systems. *Plastic Engineering & Sales Corp.*

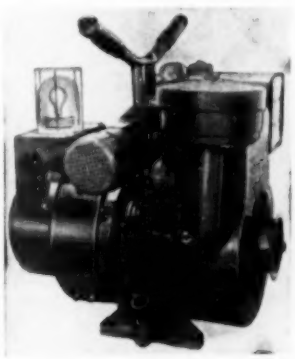
IT'S NEW CHECK IT

11 ADJUSTABLE DIRECT PRESSURE CLUTCH. This heavy-duty, nonadjustable, Lipe DP direct-pressure clutch features two design advantages: Rugged structure and broader interchangeability with other direct pressure clutches in the field have been combined with high torque capacities, minimum parts, low release loads, and positive engagement to provide for extra-heavy duty, and to meet the demands of applications which require the nonadjustable feature. Besides meeting the demands of installations where around-the-clock service is required, the DP clutch, which is of the dry-disk push-type construction, has been designed to minimize periodic inspection, maintenance, and replacement deadlines. Regular automotive clutch-pedal adjustments are applicable, when necessary, to maintain proper clearance between the clutch release bearing and the release levers on the new DP clutch. *Lipe-Rollway Corp.*



IT'S NEW CHECK IT

12 LIGHTWEIGHT D.C. ELECTRIC PLANT. Designated the Model 2050-M, the new unit is low in weight for its full 2-kw. output, and has carrying handles so it may be taken anywhere on-the-job power is needed. Total weight is 165 lb., and it delivers 2,000 watts direct current, 115 volts. This plant is especially suited for flood-lighting and operating a.c.-d.c. tools on construction projects, and for service by repair crews. The plant is powered by a one-cylinder, air-cooled gasoline engine of 4-hp., and operates at 2,800 r.p.m. The plant is fully self-contained with a 4-qt.-capacity gasoline tank. The heavy-duty, close-coupled generator has a control panel which contains four twist-lock receptacles for plug-in operation of tools, appliances, and flood-lighting equipment. A pilot light for operating illumination is also provided. *Universal Motor Co.*



IT'S NEW CHECK IT

13 RegO NO. 7114 SHUTOFF VALVE is for use on L.P.-gas engines. A diaphragm-type angle valve, it is designed for installation at the filter outlet, between the filter and the heat exchanger or vaporizer. The valve's ¼-in. standard pipe thread screws into the filter outlet. A ⅜-in. flare outlet is provided for connection of the fuel line. *The Bastian-Blessing Co.*

TRADE LITERATURE

For Copies of These Informative Brochures, Check the Corresponding Number on the TIME SAVER CARD

14 MEASURING FLOW AND LIQUID LEVEL. Twenty-four-page Bulletin 1160 describes a dozen different systems for measuring and controlling liquid level. There are brief general sections on measurement, transmission, control, and handling of difficult liquids. Also included is a two-page tabulation of 12 systems for quick comparison. *Industrial Division, Minneapolis-Honeywell Regulator Co.*

15 OXYGEN CONTROL IN CAT CRACKING OPERATIONS. The bulletin explains the important role played by oxygen during the regeneration of catalysts whose activity has been reduced by deposits of carbon on its surfaces. The measurement of oxygen is important in preventing after burning which may cause extensive damage to cyclone collectors and precipitators. The bulletin explains how losses from reduced plant throughput, overloading of cyclones, and precipitators, and increased compression costs are avoided by continuously measuring the oxygen content of the regenerator flue gases. *Arnold O. Beckham, Inc.*

16 STAYNEW AUTOMATIC FILTERS. A new 12-page illustrated bulletin describes automatic filters designed for large air volume and high efficiency. The bulletin contains specifications, engineering, and performance data covering automatic filters in a wide range of sizes for handling any desired air capacity. *Dollinger Corp.*

17 BUNA N. An informative four-page bulletin describes buna N and natural hard-rubber pumps, valves, and pipe fittings manufactured specifically for the chemical process and allied industries. Physical-property and chemical-resistance data are included, together with illustrations, performance data tables, and specification charts for corrosion-resistant buna N and natural hard-rubber products. *Vanton Pump & Equipment Corp.*

18 COMPARATIVE CORROSION RESISTANCE OF STAINLESS TUBULAR PRODUCTS. A new folder, designed to be of assitance to engineers involved in the selection of stainless tubing and pipe for corrosion-resistance applications is known as Bulletin TDC 160. The eight-page folder contains information on the comparative corrosion resistance of stainless steels to corrosive media. It presents pertinent data on six widely used stainless tubing steels and several hundred corrosive media at various temperatures and concentrations. *Babcock & Wilcox Co.*

19 HORTONDOME ROOF, VAPORSPHERE, VAPORTANK. This 12-page booklet describes the use of Hortondome roofs, Vaporspheres, and Vaportanks for reducing evaporation loss from standing storage tanks handling petroleum products. They provide a variable-volume vapor space which allows the air-vapor mixture above the liquid in tanks to expand and contract without venting vapor to the atmosphere. *Chicago Bridge & Iron Co.*

20 LIQUID-LEVEL INDICATOR SYSTEMS USING ULTRASONIC PULSES. The eight-page Bulletin S-68 describes systems which use no moving parts, but accurately indicate liquid levels in petroleum and chemical processing, and storage tanks within plus or minus 0.01 ft. Included in the booklet are information on the application engineering and diagrams describing typical installations in different types of storage tanks. *Bogue Electric Manufacturing Co.*

21 LINE BLIND VALVES. Comprehensive instructions on the proper method of installing line blind valves is contained in a new 24-page brochure. Concisely written in easy-to-follow terms, the manual is illustrated with over 34 cartoon-type drawings. A separate section of the manual is devoted to trouble shooting for faulty installation techniques along with recommended corrective procedures. While this manual deals primarily with line blind valves, its descriptions and illustrations can be applied equally to the installation of gate, globe, and plug valves as well. *Hamer Oil Tool Co.*

22 IDEAL PLUNGER LIFT is presented in a new 16-page bulletin, No. 408. The bulletin includes equipment features, including pressure cycle controllers, and profusely illustrated explanation of lift operation. There is also a section covering types of wells suitable for plunger lift. *National Supply Co.*

23 NEW ASHCROFT GAGE CATALOG. Supplemented by numerous photographs, line drawings, and dimensional drawings, the new 124-page catalog is sectionalized by product lines, and includes not only a contents, but a numerical index, an alphabetical index, selector tables for both the line of Ashcroft Duragauges and Ashcroft Quality gages. *Manning, Maxwell & Moore, Inc.*

24 REMOVING SCALE FROM WATER AND GAS LINES is a data sheet presenting case histories in the removal of deposits of iron tuberculation, silt, and sludge from water and gas lines. Literature also includes an article by John H. Rusch entitled, "Clean Your Condensers Chemically." *Dowell Incorporated.*

25 15-B AND 22-B EXCAVATORS featuring advance-design tractor-type treads for ground-gripping travel in soft, muddy going over rough terrain and up high hills are described in foldout. On-the-job illustrations show this unit working effectively in a variety of difficult operations. *Bucyrus-Erie Co.*

26 RENTAL PRICES AND HANDBOOK ENGINEERING DATA FOR DRILL PIPE AND DRILLING TOOLS. A 64-page, pocket-size booklet lists terms and conditions for rental, prices, blowout preventers, pipe dimensions and weights, flange and ring-groove dimensions, drill-collar weights, and drill-bit specifications. *Associated Oil Field Rentals.*

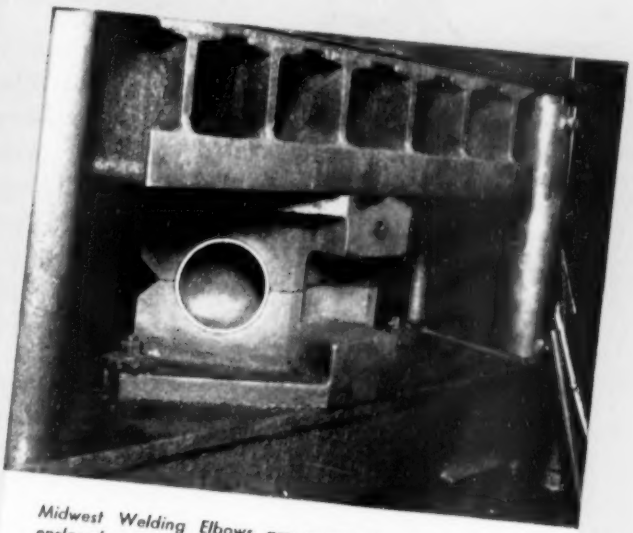
27 KNIGHT INDUSTRIAL MODELS outlines some of the applications of three-dimensional scale models in business and industry. The illustrated, four-page folder shows how such models can be used to advantage in plant layout, site development, structural planning, product development, and sales aids. *Knight Models, Inc.*

28 HOW TO CHOOSE ROPE FOR SERVICING WELLS contains guide tables of different constructions, plus reasons why one construction is better for certain jobs than another. This section shows easy way to set up reels for rewinding, things to keep in mind when storing and handling. *Union Wire Rope Corp.*

29 UNIT-LINE SUMP PUMPS. Construction details, head and capacity tables, dimensions, and other data are the subject matter contained in Bulletin 1029. The Unit-Line sump pump is a preengineered packaged line from which a pump can be selected for existing conditions for new construction. The bulletin is printed in color and fully illustrated. *Johnston Pump Co.*

Held to CLOSE LIMITS

The child cooped in his playpen is held to close limits for his own safety and health. Midwest Welding Fittings are held to close limits to save you time and money on your welded piping. Because of their exceptional dimensional accuracy and uniformity (see below), all pipe can be cut in advance according to drawings with assurance of accurate fit. Welders do not have to spend costly time struggling to line up fittings and pipe. Welding proceeds rapidly and economically with no time-wasting compensation for inaccuracies. It will pay you to specify "Midwest" the next time you order welding fittings.



Midwest Welding Elbows are accurately sized in totally enclosed compression dies that exactly control metal distribution throughout fitting. The result is true circular cross section and accurate radius, included arc, and tangents.

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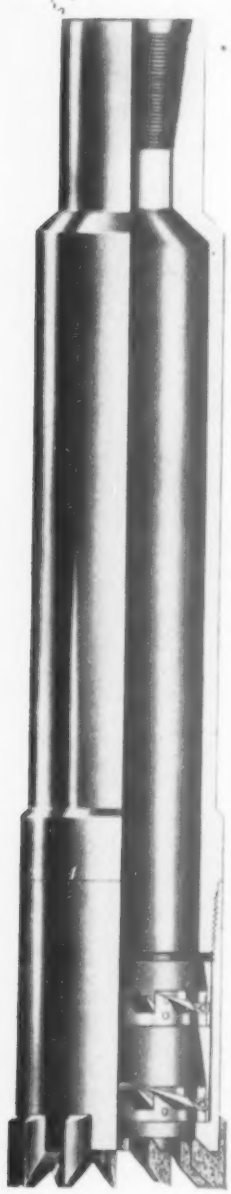

Fishing in an oil well is no fun. It's a tough job . . . and, one that ***must be done fast!***

Globe Junk Catchers are familiar friends to the oil industry, everywhere. They have performed fast and profitably, making complete recoveries of everything from snarled wire rope and small broken pieces of junk to complete pilot bits.

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Among the Drilling Contractors

West Coast Firm Has Record Drilling Year

Bell & Burden, Inc., Los Angeles drilling contracting firm, reports that during 1953 its six rigs drilled 48 wells totaling 314,855 ft. of hole, an average of 6,559 ft. per well. The amount of drilling set a new year's record for the firm.

One of these rigs, in a 90-day period, drilled 12 wells totaling 69,365 ft., an average of 5,789 ft. per well, and 770 ft. per day.

The major part of the company's activities during the year were in the Ventura area of the Coastal district of California.

Penrod Drilling Co., Shreveport, is scheduled for a Smackover test to be drilled for Shell Oil Co. on the west edge of Springhill townsite, in northwestern Webster Parish, northern Louisiana. The test, a wildcat, is 1 Braley. Spot location is in the C NW NW 11-23n-11w. Projected depth is 11,000 ft.

Tullos Drilling Co., Midland, Tex., has contracted to drill three stratigraphic tests for Atlantic Refining Co. in Jackson Parish, North Central Louisiana. Locations are on Atlantic's 8,000-acre Tremont Lumber Co. block, northeast of Eros. Holes are projected to depths of 4,700 ft.

Two R. Drilling Co. will drill a 13,000-ft. wildcat test for Tide Water Associated Oil Co. and Texas Crude Oil Co. on their State Lease 1893, 2½ miles north of Pecan Island field, in southern Vermilion Parish, coastal Louisiana.

New Contracting Firm

Hampton-Johnson Drilling Co. is a newly formed contracting and operating firm in the Illinois basin area. Principal owners are Phil Hampton, W. H. Johnson, and Ernie Spencer. Headquarters are at Salem, Ill.

Neal Drilling Co. is contractor on a projected 8,700-ft. test Southern Minerals Corp. is starting at a wildcat location 3½ miles southeast of Oakville, in Karnes County, South Texas. Location is for 1 Burnett, in the Francisco Leal Survey.

Circle Drilling Co., Lake Charles, La., is starting on two new contract jobs in Beauregard Parish, Coastal Louisiana. One is a projected 9,500-ft. wildcat test, 1 Long Bell, being drilled for Austral Oil Exploration Co., Inc., in the Caney Creek area, 3 miles north-

J. K. Butler (top left), vice president of Production Maintenance Co., Houston drilling contracting and operating firm, visits one of the company's rigs operating in Colorado County, Texas Gulf Coast. With him, in the top row, left to right, are: W. P. Woods, tool pusher; Jim Sands, pilot and safety engineer; E. A. Schroeder and James Russell, members of the crew. In the bottom row, same order, are: M. J. Haas, driller; and J. E. Ousley, and G. B. Flores, crewmen. (Photograph by courtesy of Mission Manufacturing Co., Houston.)

Prolong thread life

When threads are protected they are bound to last longer. Bestolife Lead Seal Pipe Joint Compound protects against corrosion, prevents galling and seizing, gives a perfect seal for maximum joint make-up with easy separation.

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west of Hurricane Creek field, in 20-5s-8w. The other is a 5,100-ft. confirmation test for Vincent & Welch, Inc.'s recently completed gas-condensate discovery well, 1 Walker, about 6 miles east of Hurricane Creek field.

Woolf & Magee, Shreveport, will drill a 9,100-ft. Justiss-sand test for A. J. Hodges Industries, Inc., at an outpost location, 2 Hodges, in the C SE SE 27-22n-10w, west of the northern sector of Cotton Valley field, Webster Parish, North Louisiana.

Crescent Drilling Co., Monroe, La., has contracted with Southwest Gas Producing Co., Inc., for a 9,500-ft. test to be drilled at 1 Colvin, in 8-19n-2w, south of Unionville field, Lincoln Parish, northeastern Louisiana. Nearest production is 1½ miles to the northeast.

Cable Tool & Rotary Drilling Co. is contractor on a new wildcat test Shell Oil Co. has under way at 1 Smith, in the H. Smith Survey, 10 miles northeast of Centerville, Leon County, in East Central Texas.

Iran Drilling Co. has a new operation under way for Joe Blalock in the South Hallsville area, 10½ miles southwest of Marshall, in Harrison County, northeastern Texas. Location is for 2 Bartlett & Bailey, in the C. Yarbrough Survey. Objective is around 7,000 ft.

H. L. Rowley, Inc., Shreveport, will drill a 10,500-ft. wildcat test for **BBM Drilling Co.,** of Houston. Rig is being moved to the location, 1 Teas, 5 miles southeast of Palmetto, in northeastern St. Landry Parish, Louisiana Gulf Coast. Sparta sand is the objective.

ACTIVE ROTARY RIGS*

Area—	Week ended 2-1-54	Change week ended 1-25-54	Change week ended 2-2-53
Gulf Coast	514	— 7	—102
N. & W. Tex.-N. M.	768	+68	— 12
Ark.-N. La.-E. Tex.	153	— 1	+ 24
Oklahoma	358	+20	+ 41
Kansas-S. Nebraska	147	+13	— 8
Illinois-Eastern	103	— 2	+ 27
Rocky Mountains	260	+10	+ 45
Pacific Coast	158	— 6	— 17
Total U. S.	2,461	+95	— 2
Western Canada	136	— 4	— 26
Total	2,597	+91	— 28

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States, North and West Texas and New Mexico, and Oklahoma and Kansas are shown on pages 203 and 204.

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Type "A" Mill

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Use Kinzbach Milling Tools for every whipstocking or metal cutting operation. Bodies are made of high quality steel, shaped for best cutting results. They have high-speed tool steel inserts which are ground and set at the most efficient angle for fast, uniform cutting action. Shown here are four popular models—see your Kinzbach Catalog for a description of the complete series of Kinzbach milling tools.

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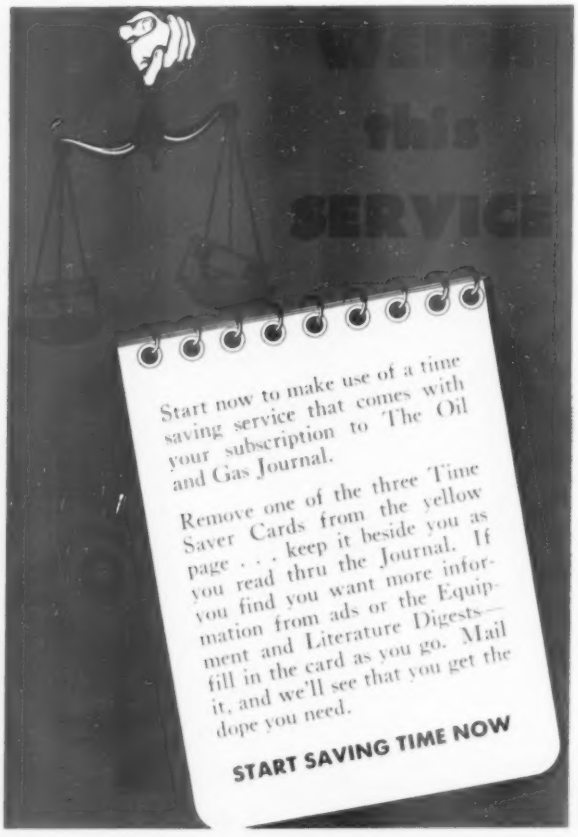
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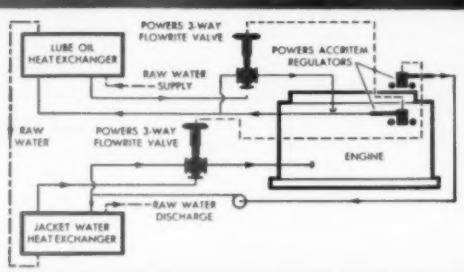

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Consulting Engineers: J. & G. Daverman Co., Grand Rapids, Mich.

3 FAIRBANKS-MORSE 3500 H.P. DUAL-FUEL ENGINES

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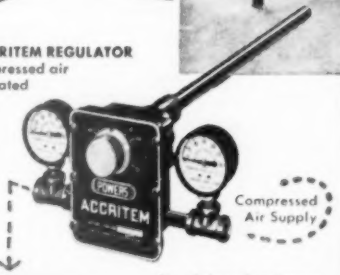

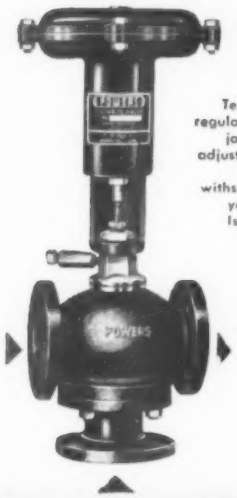

Six of these Regulators and six **FLOWRITE** valves control lube oil and jacket water used in the F-M engines above.

Temperature sensitive bulb of regulator is inserted in lube oil or jacket water line. Has easily adjusted temperature adjustment dial. Rugged construction withstands vibration and insures years of dependable service. Is unsurpassed for reliability and power to control diaphragm valves.

Left: POWERS 3-Way **FLOWRITE** Control Valve. Six 6" pipe size valves are used in the above installation. They have many superior features which make them especially suited for large engines.

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For each engine or air compressor there is a "best temperature for the lube oil and cooling water". To insure that temperature at all times regardless of variations in load or seasonal changes in temperature of water supply, install Powers Thermostatic Regulators.

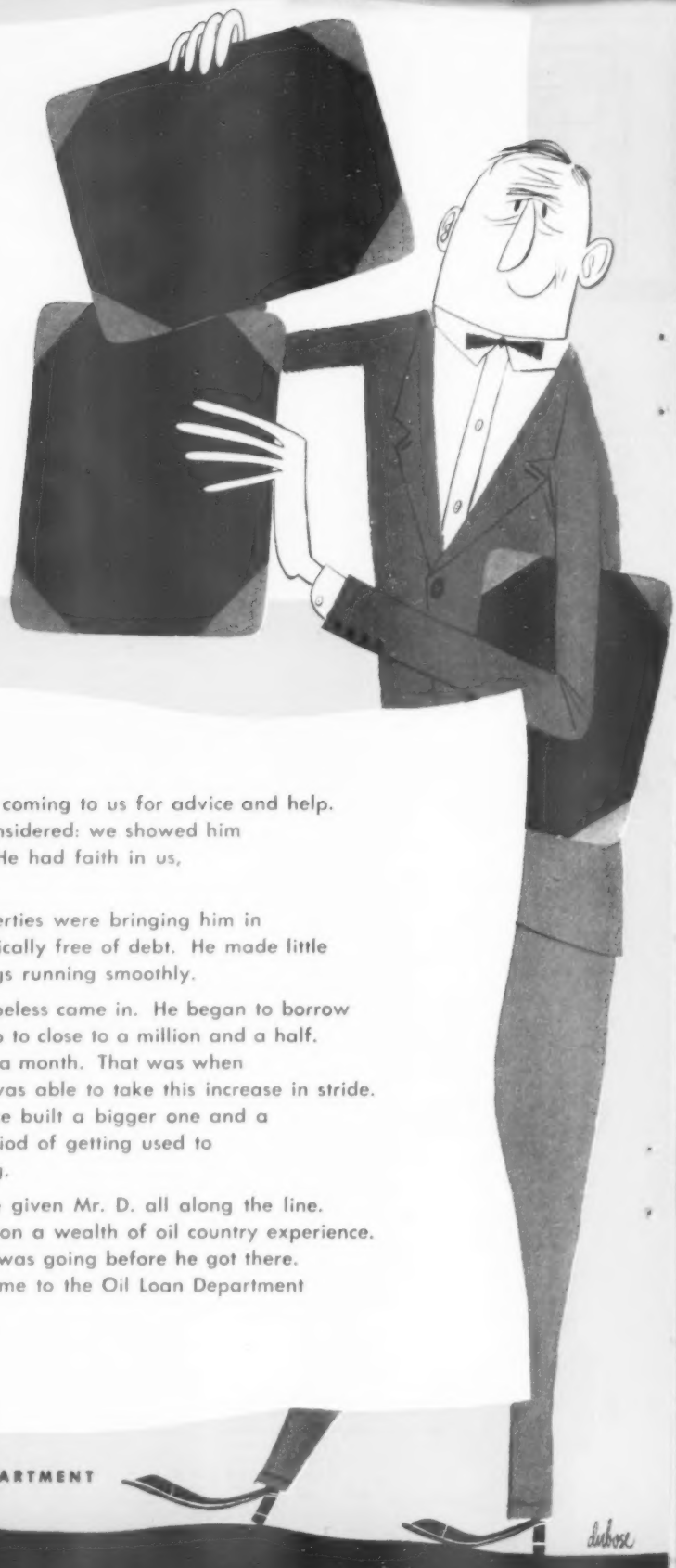
Powers Regulators have been time tested and proven reliable on many large and small installations. ACCRITEM Regulators and FLOWRITE Valves shown at left are unsurpassed for dependable control of large size valves. For smaller engines Powers No. 11 Self-Operating Regulators have been widely used for many years. Either of these controls can be applied to your present engines if they are not already protected.

For the Right type Control for Your Engines or Air Compressors— contact Powers nearest office or write us direct. (b-63)

POWERS CONTROL

THE POWERS REGULATOR COMPANY

Mr. "D" came for advice



When Mr. D. first got started he began coming to us for advice and help. We helped him in a way that he had not considered: we showed him the need for building a good organization. He had faith in us, and he did build a good operation.

Mr. D. was doing pretty well. His properties were bringing him in around $25,000 a month, and he was practically free of debt. He made little deals all the time, just enough to keep things running smoothly.

Then a wildcat that was considered hopeless came in. He began to borrow to define his field limits, and his debt ran up to close to a million and a half. But his income jumped to around $100,000 a month. That was when Mr. D.'s organization paid off for him. He was able to take this increase in stride. With the nucleus of a strong organization, he built a bigger one and a strong one. Instead of having a difficult period of getting used to bigger operations, he sailed smoothly along.

We are proud of the help that we have given Mr. D. all along the line. We helped him with impartial advice based on a wealth of oil country experience. We helped him because we knew where he was going before he got there. This sort of help is why oil men **going up** come to the Oil Loan Department of The National Bank of Commerce.

E. O. BUCK, VICE PRESIDENT, OIL LOAN DEPARTMENT

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Facilities of the Oil Loan Department of The National Bank of Commerce are available in Wyoming, Colorado, Nebraska, New Mexico, Texas, Louisiana, and Mississippi.

PIPE LINES

Texas Gas Asks Permit For Construction Program

OWENSBORO, Ky.—Plans for a $1,596,000 construction program in Louisiana have been submitted to the Federal Power Commission by Texas Gas Transmission Corp.

Texas Gas plans to construct 24 miles of 16-in. natural-gas transmission line in South Louisiana gas fields, install an additional 2,000-hp. compressor unit at Bastrop, La., and build a purchase meter station in South Louisiana.

Two Texas Gas subsidiaries, Louisiana Natural Gas Corp. and Texas Northern Gas Corp., have applied to the FPC for removal of volumetric limitations on deliveries of gas they may make to the parent company.

The companies are now limited by the FPC to deliveries of 140,000 M.c.f. of gas daily. Texas Gas said the deliveries could be increased to about 197,000 M.c.f. daily if the proposed facilities are approved.

The proposed pipe line would extend from the existing interconnections of the facilities of Texas Gas and Louisiana Natural Gas in North Tepetate field of Acadia Parish, Louisiana, to connect with existing facilities of Louisiana Natural Gas near South Roanoke field in Jefferson Davis Parish.

The purchase meter station would be installed at the point of interconnection of the facilities near South Roanoke field.

Court Rejects Damage Suit Against Gas Pipe-Line Firm

LOS ANGELES, Calif.—A damage suit against Southern California Gas Co. for refusal to act as a common carrier has been rejected by the Ninth Circuit Court of Appeals.

The suit was brought by Interstate Natural Gas Co., which asked damages against Southern California Gas for failure to transport its gas for which Southern California Gas had no contract.

The court held Interstate Natural's claim is in effect a collateral attack against an order of the Federal Power Commission, and that its real grievance concerns Southern California's contract for carrying the gas of other producers.

The construction of Southern California's line was based on a 30-year contract with other producers obligating it not only to carry a minimum of the pipe line's load factor of 91 per cent of the line's capacity, but for its entire use if necessary.

The FPC approved the line under those terms and the pipe-line company is bound to conform to the provisions of that contract unless relieved from them by the commission.

Union Oil Begins Work On New Pumping Station

LOS ANGELES, Calif.—Union Oil Co. of California has started construction work on a remote-controlled, diesel-powered pump station at Norwalk to replace an existing steam plant there.

The new pump station is a part of the company's continuing extensive program of modernizing existing pipe-line facilities for increased efficiency and economy.

The new station will be an automatic booster delivering crude oil received from Stewart station and Santa Fe Springs to the Los Angeles refinery.

The station is so heavily constructed and insulated as to be practically soundproof. All but one storage tank will be eliminated.

Platte Adds Asphalt-Type Crudes to Those Handled

KANSAS CITY, Mo.—Platte Pipe Line Co. has added a special asphalt-type crude oil to the other three types handled when the line began operation a year ago.

The line originally segregated crudes into sweet, intermediate, and general sour streams. The low-gravity asphalt-quality stream has been added after a trial period of several months.

Segregation of the asphalt-quality crudes from the general sour crudes, improves the gravity of the general sour stream for shippers who desire the lighter oil. And asphalt-making refineries will receive a crude oil which best suits their needs.

Platte is now constructing two additional main-line stations to increase capacity to 145,000 from 110,000 bbl. per day *(The Oil and Gas Journal, December 21, page 344)*.

Platte is owned by British American Oil Co., Continental Oil Co., Ohio Oil Co., Pure Oil Co., and Sinclair Oil Corp.

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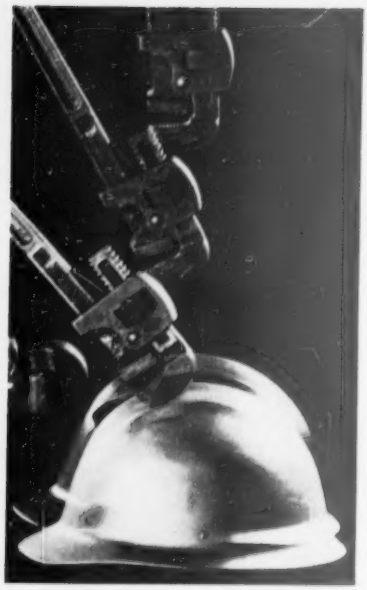

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Plains Pipe Line System Expansion Plans Announced

DALLAS, Tex.—Work was scheduled to start last week on an expansion of the capacity of Plains Pipe Line Co.'s crude-oil gathering system in the Newcastle, Wyo., area from the existing 17,000 to 25,000 bbl. daily.

Controlling interest in Plains Pipe Line was acquired by the C. W. Murchison interests of Dallas January 29, for an undisclosed sum.

The present Plains Pipe Line system consists of an 81-mile, 8-in. line from Newcastle to Lance Creek. The system serves Mush Creek, Lance Creek, Fiddler Creek, Hay Creek, and North Clareton fields.

Under the expansion program, Plains will extend its 8-in. main gathering line more than 25 miles from Newcastle to serve the new and active South Clareton producing area.

The project, a Murchison spokesman said, also involves laying an as yet undetermined number of miles of smaller field gathering lines and building a new pump station at an undecided location along the main line.

Construction work should be finished in from 3 to 4 months, the Murchison official said. Much of the production in the field is now shut in because of line capacity.

El Paso to Build Line

WASHINGTON.—El Paso Natural Gas Co. has asked for authority to construct about 32½ miles of 10¾-in. pipe line, enabling the company to buy 20,000,000 M.c.f. of natural gas daily in Reagan County, Texas.

Estimated to cost $798,600, the project would include the new line and a purchase meter stattion for metering gas purchased from Barnhart Hydrocarbon Corp. The line would extend from Barnhart's gasoline plant in Reagan County to a connection with El Paso's existing system in Upton County, Texas.

Gathering System Completed

WINNIPEG, Man.—An 11½-mile gathering system connecting Daly field near Virden, Man., with Interprovincial pipe line at Cromer, Man., has been put into operation.

The $250,000 system has a capacity of 15,000 bbl. daily. Initial flow was about 2,500 bbl. daily, all from Daly field, but at least 1,500 bbl. daily will be added once the line is connected with nearby Virden - Roselea field. Crude formerly was transported to Cromer by tank trucks.

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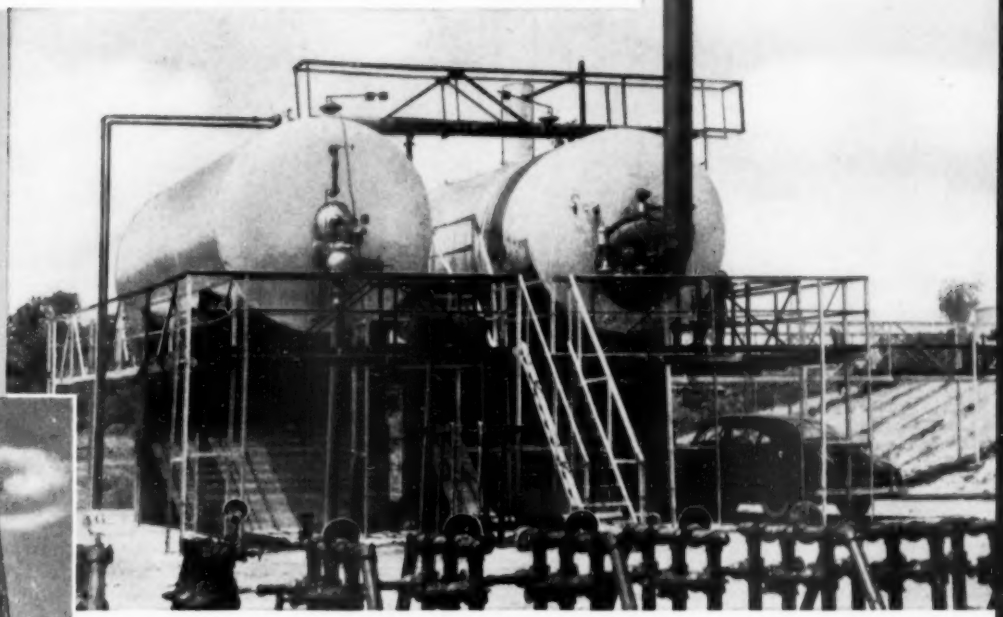

This BS&B Installation near Gladewater, Texas, is an example of how large volume treating requirements may be handled. It consists of a BS&B Special Free Water Knockout and a BS&B Special HGT 1028 Horizontal Treater, with a capacity of 30,000 bbls./day. Standard sizes of the HGT will meet capacity requirements ranging from 100 to 4800 bbls./day.

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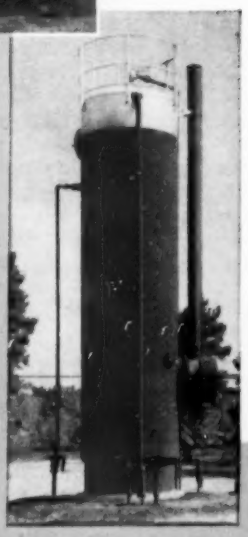
Oilfield requirements for emulsion treaters vary widely from lease to lease and climate to climate. Some situations call for horizontal treaters — some for vertical; some for small capacity — some for large; some for extremely cold weather operation — some for more moderate or very hot climates. Treating problems may be relatively simple — others extremely difficult.

But *no matter what* your treater requirements ... BS&B has a treater that will meet them *perfectly*, and which will give years of efficient and trouble-free service. "Down time" for maintenance or repairs will be *considerably less* than for most other makes of treaters.

If you haven't enjoyed the satisfaction of operating a BS&B Emulsion Treater on your lease, we'd suggest you get the facts from your BS&B Man. Or, write for catalogs and information. There's no obligation!

This BS&B Type "J" Vertical Treater installation is typical of many that are handling particularly tough treating problems throughout the oil country. Depending on treater size, the Type "J" will meet capacity requirements of from 100 to 3600 bbls./day. Type "JCW" is similar to the Type "J", except that it has several additional features which fit it for operation in extremely cold climates.



For low cost treating under average conditions, BS&B Type "S" Vertical Treaters like this one perform excellently. It has a capacity range of from 100 to 2500 bbls./day, depending on the size of the treater. The Type "SCW" is structurally the same as the Type "S", except for modifications to adapt it to cold weather operation.

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REFINING

Record Contract Let for Cathodic-Protection Project

HOUSTON.—One of the largest turnkey cathodic-protection-installation contracts ever let has been awarded to Cathodic Protection Service's service division by Cities Service Refining Corp. at its 175,000-bbl. Lake Charles, La., refinery.

The contract, together with a previous smaller contract covering primarily the protection of the underground lead-sheathed cable, will represent a total of about $200,000 expended for cathodic protection at the Cities Service refinery.

The contract covers installation of a cathodic-protection system for protection of the major portion of the underground piping, and essentially all tank bottoms of the tank-storage area.

Under the contract, Cathodic Protection will install between 2,500 and 3,000 amp. of direct-current generating capacity, using selenium rectifiers and graphite-anode ground beds as the current source.

Construction of Platformer For Phillips Petroleum Started

BARTLESVILLE, Okla.—Construction got under way on January 15 on a new 16,000-bbl. per day Platformer at Phillips Petroleum Co.'s refinery at Sweeny, Tex., in the Gulf Coast area south of Houston.

Procon, Inc., is contractor for the construction, which is expected to be completed by November 1. Construction of adjacent auxiliary facilities for the unit was started last November.

Processing equipment at the 86,000-bbl. per day Sweeny refinery includes two crude-distillation units, a thermal cracker, a fluid catalytic cracking unit, a gas-recovery plant, and a hydrofluoric acid alkylation unit.

The new unit will produce high-quality blending stock for premium gasoline. The refinery supplies products in the Gulf Coast area, Florida, states along the Mississippi River, and for export.

Work Started on Sunray's New 5,000-Bbl. Platformer

TULSA, Okla.—Foundation work was begun last week on a new 5,000-bbl. per day Platformer being built by Sunray Oil Corp. in conjunction with its catalytic cracking refinery at Sunray Village (Duncan), Okla.

The new Platformer, another in a series of improvements at the refinery, will require about 10 months to complete. Construction is being done by Refinery Engineering Co. of Tulsa. Engineering work on the Platformer is being done by Mechanical Design, Inc.

High-quality gasoline product to be produced as a result of the new installation will be available for marketing through a new 475-mile products pipe line now being built by Oklahoma Mississippi River Products Line, Inc., from Duncan to West Memphis, Ark., on the Mississippi River.

Sohio Mining Caverns for Storage of Propane, Butane

CLEVELAND.—A series of large caverns 455 ft. underground will be mined by Standard Oil Co. (Ohio) at its Lima, Ohio, refinery for the storage of 60,000 bbl. of liquid propane and butane gases.

The project estimated to cost $450,000, starts with the drilling of four small-diameter holes into which will be pumped a sealing compound to form an underground barrier against water seepage.

A 12-ft. shaft will be sunk to a depth of 455 ft., and at the bottom of the shaft six caverns, each 100 ft. long, 20 ft. wide, and 50 ft. high, will be blasted out of the solid rock.

Preliminary core drilling exploratory work for the caverns was conducted under the supervision of Sohio Petroleum Co. production department men from Oklahoma City, who also will supervise the actual mining of the caverns.

Storage in the caverns, the first done by Sohio, is expected to start early next year, permitting the recovery of more of the propane production of the Lima refinery.

Lion Puts New Facilities On Stream at El Dorado

EL DORADO, Ark.—New facilities modernizing Lion Oil Co.'s refinery here and increasing crude-charging capacity from 22,000 to 24,000 bbl. per day have been placed in operation.

The facilities, constructed at a cost of about $5,500,000, include a fluid catalytic cracking unit, vapor-recovery

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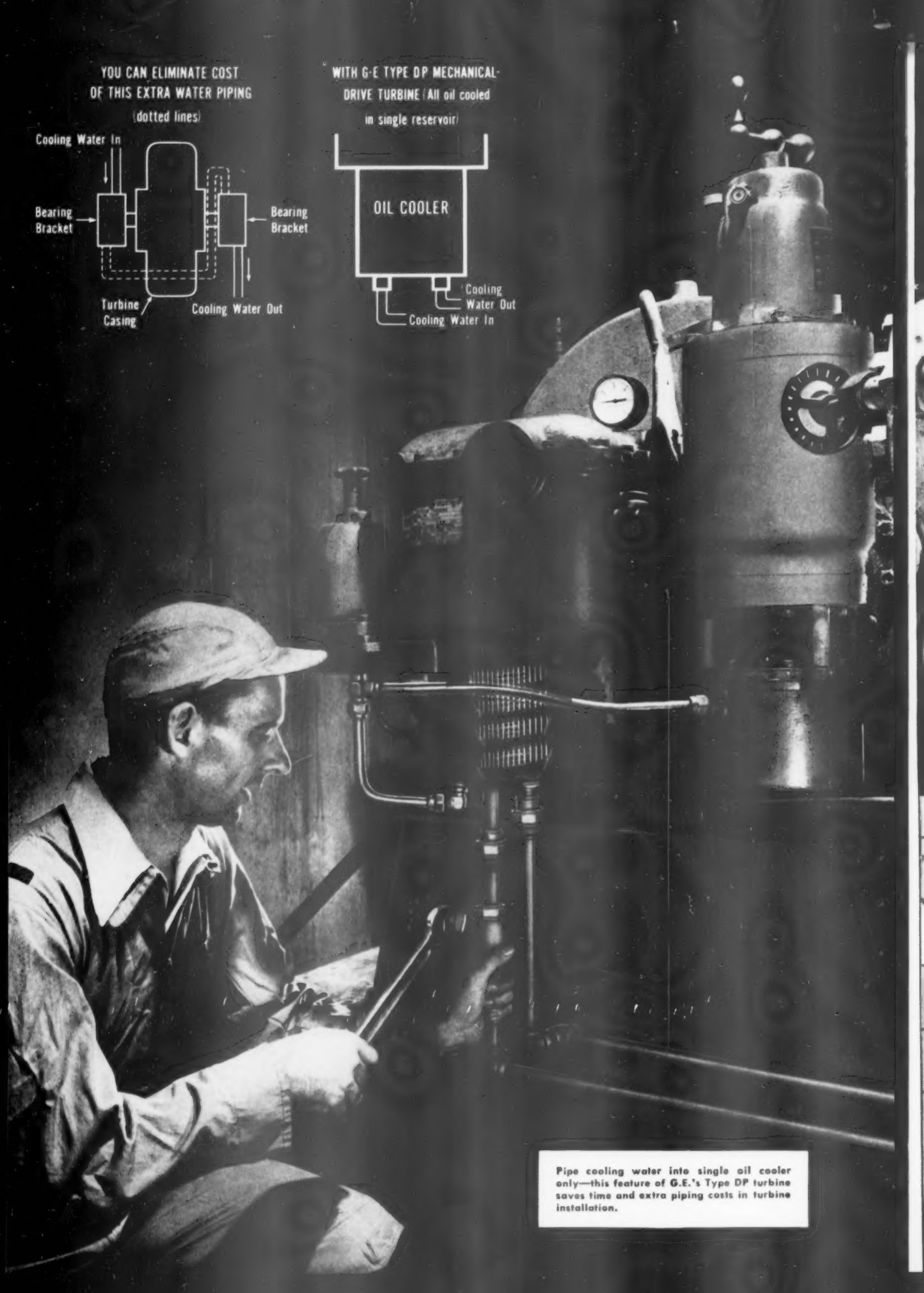

Pipe cooling water into single oil cooler only—this feature of G.E.'s Type DP turbine saves time and extra piping costs in turbine installation.

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You save on installation costs with a G-E mechanical-drive turbine because General Electric pipes the bearing oil back to a single reservoir for cooling, in a single oil cooler. This eliminates the extra costs of running cooling water piping to and between each bearing. This feature alone can save you up to $50.00.

This single oil cooler is just one of the many features on the Type DP turbine which save you money. The chart below indicates other areas of savings.

Remember—the total cost is often more than just the sales price. But G.E.'s standard DP turbines include the extra features that save you extra costs. For more information contact your nearest G-E Apparatus Sales office. Write for bulletin GEA-4955A, "A New Standard in Mechanical-drive Turbines." General Electric Company, Schenectady 5, N. Y. 152-64

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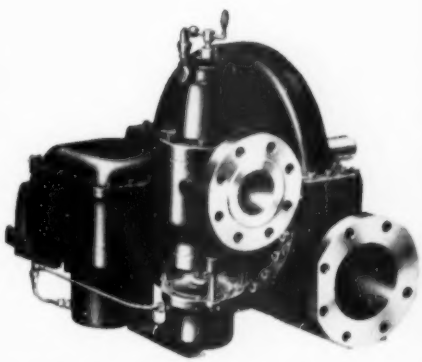
ESTIMATED TOTAL SAVINGS	$420.00



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Engineering Work Started On Great Northern Refinery

ST. PAUL, Minn.—Lummus Co. has been employed to do preliminary engineering work for the new 20,000-bbl. daily refinery planned near here by Great Northern Oil Co. and has already begun work on the project.

William J. Carthaus, president of the newly formed oil company, said last week he hopes to be ready to call for construction bids on the refinery next month.

A 10-year supply of medium-gravity Saskatchewan crude has been committed to the refinery by Socony-Vacuum Exploration Co., Woodley Canadian Oil Co., and Southern Production Co. Plans for a pipe line to transport the crude to the refinery site have not yet been completed.

Petrochemicals

Warren Lets Contract for New Petrochemical Plant in Texas

TULSA, Okla. — Contract for construction of a new $2,000,000 petrochemical plant near Conroe, Tex., has been awarded to O. L. Olsen Co., Houston, by Warren Petroleum Corp.

Work on the new plant will begin immediately and completion is scheduled for July 1. The plant will obtain raw materials from Midland Gasoline Co., and will produce about 2,500,000 lb. of pentaerythritol, 4,000,000 lb. of methyl alcohol, and 2,000,000 lb. of acetaldehyde annually by an improved oxidation process developed in Warren's research laboratory.

The plant was originally scheduled for construction on the Houston ship channel but was later moved to Conroe *(The Oil and Gas Journal, December 21, page 348).*

It will be located on the site of Humble Oil & Refining Co.'s former production camp about 3½ miles east of Conroe and adjacent to the Santa Fe Railway.

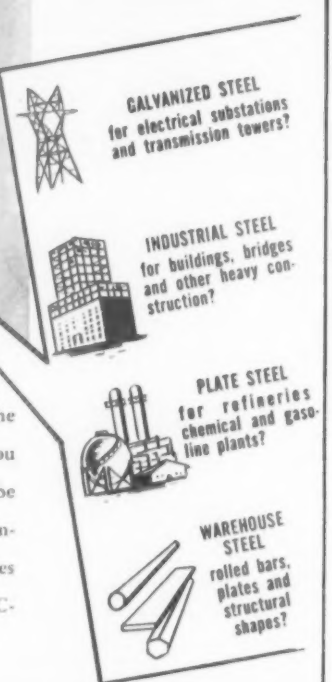
Koppers Plans to Build Polyethylene Pellet Plant

PITTSBURGH, Pa.—Koppers Co., Inc., is considering several sites for manufacture of polyethylene in pellet form in a major expansion of its chemical division.

Port Arthur, Tex., where the firm already has a plant for production of chemicals which went into operation less than a year ago, is one of the sites under consideration.

Construction of the new plant is scheduled to start this spring and operation is scheduled for the middle of 1955. The engineering and construction division of the company will be the principal contractor.

IS YOUR PROBLEM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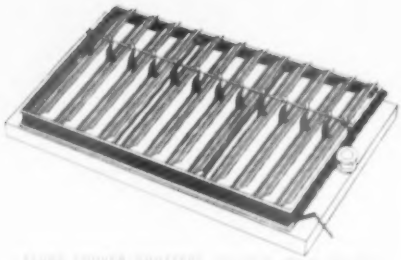

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For protection during severe cold and to prevent exit fluid temperatures from dropping below the design point, Fluor Fin-Fan air-cooled heat exchangers may be equipped with louver-type shutters over the fin-tube sections, or with rolling steel doors at ground level to regulate the flow of air across the extended surface. In extreme cases air can be recirculated to maintain desired temperatures. Fluor furnishes Fin-Fan installations for reliable performance under any weather conditions.

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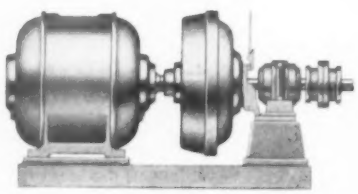
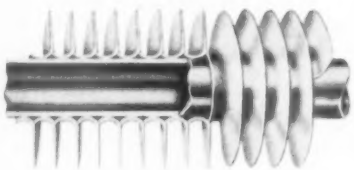
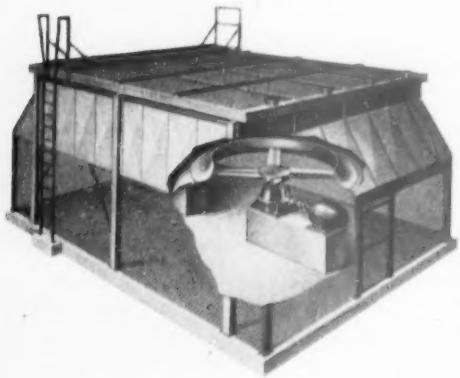
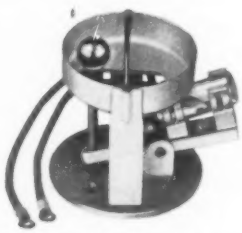


VARIABLE SPEED FLUID DRIVE



FIN-FAN





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Discussions, papers to highlight 2-day session

NEW ORLEANS, La.—All-afternoon luncheon conferences and two morning general sessions will highlight the American Gas Association gas supply, transmission, and storage conference here March 4 and 5.

The March 4 luncheon conference will include discussions on communications, compressor stations, large-volume gas measurement, pipe lines, and underground storage.

Compressor stations, dehydration, dispatching, natural-gas production, and pipe-line construction will be discussed in the luncheon conference on March 5.

Papers at general sessions will include:

MARCH 4

"Communications Relations with the Federal Communications Commission," J. E. Keller, of Dow, Lahnes & Albertson, Washington, D. C.; "Drilling Wells with Gas or Air as a Circulating Medium Instead of Mud," C. L. Perkins, El Paso Natural Gas Co., El Paso, Tex.; "Pipe Line Breaks—A Critical Problem of the Gas Transmission Industry," D. C. Palm, Natural Gas Pipeline Co. of America, Chicago; and "Pulsation Exploration as it Affects Gas Measurement," Prof. Eric Lindahl, University of Wyoming, Laramie, Wyo.

MARCH 5

"The Operating Section," F. J. Pfluke, Rochester Gas & Electric Corp., Rochester, N. Y.; "A Review of Hydraulic Fracturing in the Petroleum Industry," George C. Howard, Stanolind Oil & Gas Co., Tulsa, "Progress in Compressor Station Operations," Rex V. Campbell, Michigan-Wisconsin Pipe Line Co., Detroit, Mich.; "Dispatching the Nation's Natural Gas Through Interconnected Pipe Line Systems," Carl Kallina, chief of certificate section, Federal Power Commission, Washington; "Gas Storage in a Depleted Oil Reservoir," William F. Burke, Lone Star Gas Co., Dallas; "The A.S.A. Code for Pressure Piping—A Progress Report," F. A. Hough, Southern Counties Gas Co., Los Angeles; and "Chemicals from Gas, Petroleum, or Coal," Dr. R. L. Bateman and T. R. Ragland, Carbide & Chemicals Co., New York.

Columbian Carbon Plans New Carbon-Black Plant

NEW YORK.—A new carbon-black plant with ultimate annual capacity of 60,000,000 lb. will be built by Columbian Carbon Co. in St. Mary's Parish on the Intracoastal Canal near North Bend, La.

Construction of the plant is expected to begin this month, and the first unit is scheduled to go into operation in November. The project is expected to cost more than $3,000,000.

Raw materials for the new plant will be natural gas from nearby fields and liquid fractions from Gulf Coast refineries. The processes will include the company's latest research and engineering developments in producing carbon black.

Wyoming Dehydrating Plant Construction is Scheduled

WORLAND, Wyo.—Construction is scheduled to get under way in mid-April on a jointly owned dehydrating and sweetening plant which will process Manderson field sour gas.

Socony-Vacuum Oil Co., Inc., will direct construction operations. Other owners include Gulf Oil Corp., Stanolind Oil & Gas Co., Sohio Production Co., G. & N. Oil Co., and Mule Creek Oil Co.

A concentrated hydrogen-sulfide stream from the gas plant will go to a sulfur-recovery plant to be built by Jefferson Lake Sulphur Co. near Manderson. Ralph M. Parsons Co., Los Angeles, will erect both plants.

Residue gas will be taken by Montana-Dakota Utilities Co.

Construction of both plants is scheduled for completion this autumn.

Natural Gasoline

Richfield Starts Expansion Of Coles Levee Gasoline Plant

BAKERSFIELD, Calif. — Richfield Oil Corp. has started expansion of its North Coles Levee natural-gasoline plant west of here to 100,000 M.c.f. gas daily, an increase of approximately 25,000 M.c.f. daily in high-pressure capacity.

The expansion program will include the adidtion of 3,300-hp. in compressors. A new 25,000 M.c.f. absorber recently was erected at the plant.

The increased capacity will make approximately 90,000 M.c.f. of gas available for injection in a pressure-maintenance program in North Coles Levee field. High-pressure gas production of the company's wells in Wheeler Ridge field is being brought to the plant through a recently completed 25-mile, 10-in. line which operates at 900 psi.

Kayser to Address N.G.A.A. Meeting at Odessa, Tex.

ODESSA, Tex.—Featured speaker at the Permian basin regional meeting of the Natural Gasoline Association of America here February 26 will be Paul Kayser, president of El Paso Natural Gas Co., El Paso, Tex.

Kayser's address will open the afternoon session of the meeting in the Lincoln Hotel.

One of the highlights of the morning session will be a panel on engine and compressor maintenance, featuring discussions on:

"Effects of Unbalanced Initial Pressure on Power Cylinders in Two-Cycle Engines," Vern Ford, Clark Brothers Co., Tulsa; "Importance of Maintaining Proper Valve Lift on Compressor Valves," A. R. Worster, Ingersoll-Rand Co., Painted Post, N. Y.; and "When Should Piston Rings be Replaced," C. J. Kremer, Jr., C. Lee Cook Manufacturing Co., Louisville, Ky.

Papers to be presented at the meeting are:

Morning Session

"Some Practical Aspects of Orifice Meter Measurement," W. R. Kehoe, American Meter Co., Erie, Pa.; and "Is Your Plant Corroding?" E. W. Wallace, Shell Oil Co., Houston.

Afternoon Session

"Petrochemicals in West Texas?" Harold A. Legatski, Phillips Petroleum Co., Bartlesville, Okla. and "History and Future of the Permian Basin," V. E. Cottingham, chairman, North Basin Engineering Committee, Midland, Tex.

The afternoon session will also include a movie, "Man Against the Mountain," showing the construction of a crude oil pipe line in the mountains of Vancouver, B. C. Guinn Williamson of Midwestern Constructors, Inc., Tulsa, Okla., will present the film.

The Texas Co. to Put Gasoline Plant in Operation

LOS ANGELES.—The Texas Co.'s gasoline plant for Honor Rancho field, 35 miles northwest of here, is expected to be placed in operation about April 1.

The plant, with a daily capacity of 18,000 M.c.f. will process gas from the company's 18 Honor Rancho wells and from 45 producers in the adjacent Castaic Hills field. Both fields are still undergoing development.

Absorption will be carried out at 350 psi. Residue gas will at first be sold to a transmission company but ultimately will be used in planned pressure-maintenance activities. The plant is being constructed by Offco Construction Co., Long Beach.

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LEADING THE FIELD OF SEISMIC EXPLORATION

EXPLORATION

There May Be Oil in the Silver State

by Frank J. Gardner

ANOTHER "first" has just been recorded for the oil industry with the opening of commercial oil production in South Dakota, the twenty-eighth state to produce oil in marketable quantities. A new state in the oil-producing column is a significant achievement, and already the annalists are scouting possible contenders for the title of twenty-ninth oil producer.

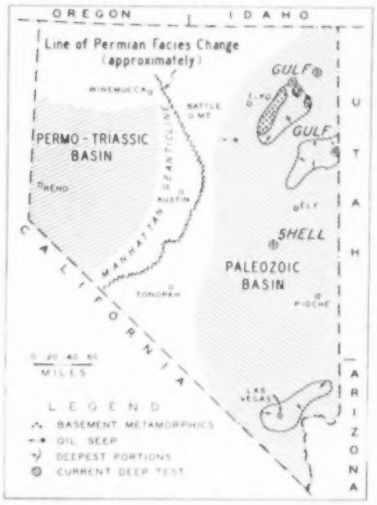
Two lusty candidates are even now in the race; Arizona has reported good showings of oil and gas in a drill-stem test of the Hermosa (Pennsylvanian) formation, while Nevada is attracting widespread attention with a quartet of deep wildcats.

Shell Oil Co. 1 Navajo, in the Black Mesa basin of northeastern Arizona, has run tests this week indicating possible presence of oil and gas in the Hermosa at a depth of 4,619-4,772 ft. Previous wildcats in this basin have reported small showings without establishing commercial production and oil scouts are watching the Apache County venture with great interest as a possible first producer for Arizona.

Arizona's neighbor to the northwest is the scene of greater exploration activity than ever before in its history. With little fanfare, Nevada has undergone extensive geological and geophysical surveys since 1950, and four deep wildcats are now testing the possibilities of oil in the Paleozoic basin which occupies the eastern half of the state.

Oil exploration in Nevada is not new. In the 1890's, claims were filed on the oil-shale lands around Elko, scene of today's activity. Some 10 years later, several wells were drilled for oil without success, and in the years since, numerous shallow wildcats have been recorded. Between 1916 and 1920, three small plants were built to treat oil shale, but after several years of intermittent and noncommercial operation and a production of about 500 bbl. of oil, they were shut down. The U. S. Geological Survey has estimated there are about 7¼ million tons of these oil shales in the Lower Tertiary beds, with an average potential yield of not more than 15 gal. of crude oil per ton.

Nevada has also been the scene of many nefarious schemes and wildcat oil companies that bilked the public out of millions of dollars in the early part of the century; in 1921, the legislature passed an act offering a $25,000 bonus for the first commercial oil well in the state, but since it succeeded only in promoting the work of illegitimate operators, the act was repealed in 1927.



Major geologic features of Nevada, and deep wildcats now drilling.

Geologically, Nevada lies within the Basin-and-Range province and displays three major tectonic features: the Permo-Triassic sedimentary basin, the Paleozoic sedimentary basin, and between them, a Paleozoic high known as the Manhattan geanticline. Of the two basins, the eastern or Paleozoic basin offers the better possibilities for oil accumulation, and it is here that an active wildcatting program is now under way. Gulf Oil Corp. has three 6,000-ft. tests seeking the Humboldt (Pliocene) formation, and Shell is drilling a 6,000-ft. hole southwest of the Gulf wells (see map).

This Paleozoic basin extends eastward into Utah and has an area of more than 70,000 sq. miles; it is believed to contain nearly 287,000 cu. miles of sediments (80 per cent of them marine). Its western edge is thought to lie along the line of Permian facies change on the eastern flank of the Manhattan geanticline. Its geologic structure, as yet not fully known, is complex and is characterized by innumerable faults, folds, and intrusions; structural anomalies favorable to the accumulation of oil are legion.

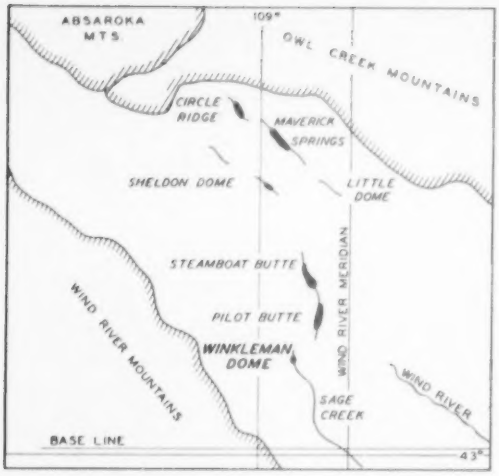
Evidences of oil and gas in this eastern basin of Nevada have been recorded in numerous cases in the form of surface oil shales, fossils containing small amounts of free oil, gas and oil seeps, and actual showings in wells. The one legitimate oil seep on record is on the Bruffy ranch; here, the oil oozed out of Mississippian strata onto the surface of the water in a well drilled for irrigation purposes. Whether these evidences indicate commercial oil accumulations or simply residual deposits is still in doubt, but they do point up the existence of petroleum at one time.

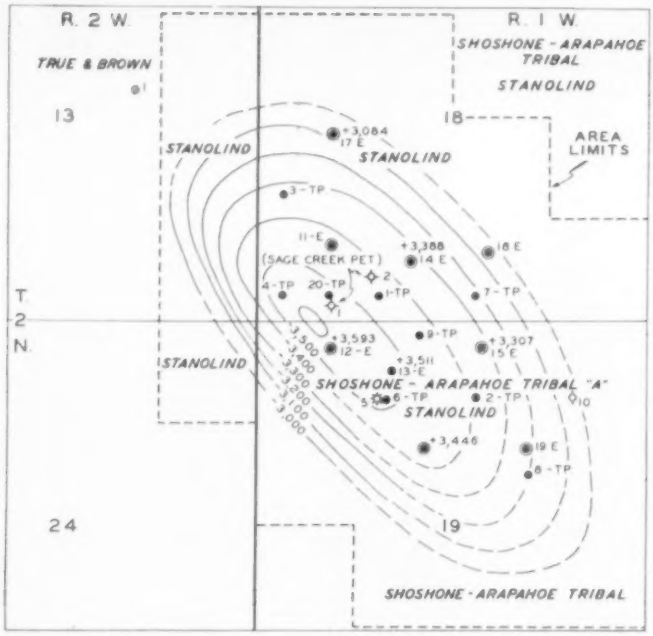
Potential reservoir rocks are present in the permeable sand sections of the Tertiary and Mississippian, limestones in the Devonian and Ordovician, and dolomites of Silurian age.

The deepest well in Nevada was drilled in 1952 by Standard Oil Co. of California and Continental Oil Co. to a total depth of 11,543 ft., where it was abandoned after logging only traces of oil and gas in Permian strata. The hole penetrated 558 ft. into the Mississippian after topping the Diamond Peak formation at 10,985 ft. It was considered a conclusive test of the Summit Springs structure of White Pine County, and was situated approximately halfway between the current wildcats by Gulf and Shell.

Geophysical and leasing work reached a peak in the state during 1952, when 81 crew-weeks of seismograph and gravity-meter activity were recorded; besides Gulf, Shell, and Standard of California, leases were taken by Carter Oil Co., Phillips Petroleum Co., and The Texas Co.

In eastern Nevada, then, the exploration geologist finds all the essential elements for the production of oil, except, so far, the oil; source rocks, reservoir rocks, evidences of migration, and favorable structures. The one final discovery medium will be, as always, the drill; and if present and indicated future drilling programs continue, Nevada may well be the twenty-ninth state to produce oil. Certainly the odds are just as good as those around the rotaries in Las Vegas!





PLACE-FIX MAP (above) of Wind River basin showing location of Winkleman dome oil field of Fremont County, Wyoming. (Fig. 1).

SUBSURFACE STRUCTURE CONTOUR MAP (right) of Winkleman dome mapped on top of Embar (Phosphoria) limestone of Permian age; Embar oil wells are circled. Contour interval: 100 ft. Datum plane: mean sea level. (Fig. 2).

Nine Embar Wells at Winkleman Dome Producing 1,500 Bbl. of Oil per Day

by Joseph A. Kornfeld

District Editor

RECENT development of the Permian Embar reservoir at Winkleman dome field, Fremont County, Wyoming, in the Wind River basin, has boosted total field production to 4,100 bbl. per day. At present the Embar produces 1,500 bbl. of oil per day from nine wells and the Tensleep reservoir makes 2,600 bbl. per day from the same number of wells. (See Fig. 1).

During 1953, Stanolind Oil & Gas Co. completed a nine-well development program in the Embar reservoir found at about 3,000 ft. This reservoir was discovered in 1948 with completion of Stanolind's 11 Tribal-Government from a total depth of 2,921 ft. Productivities of as much as 482 bbl. of oil per day (14-E Tribal-Government) have been encountered.

Geologic Features

Winkleman dome is a topographic high of dissected outcrops of Mowry and Thermopolis formations surrounded by ridges of resistant sandstone of the Cretaceous Frontier formation.

Approximately 250 ft. of structural closure is revealed on a key bed in the Cretaceous Mowry shale formation as shown by surface work conducted by John G. Bartram, of Stanolind. His work disclosed a northwest-southeast trending asymmetrical anticline with a length of 2 miles and a width of 1½ miles.

This anticline is situated on the same regional fold as North Sage Creek. Dips range from 26° to 71° on the southwest flank and from 6° to 20° on the northeast flank of the structure. Structural closure on the base of the Frontier formation approximates 250 ft.

At least four normal faults have been mapped on this structure with displacements ranging up to 200 ft. These faults were mapped on the north and northeastern flanks of the structure. However, a subsurface study of electric logs from drilled wells indicates that these faults disappear at a shallow depth.

Embar Reservoir

Productive closure in excess of 500 ft. is known from wells finished in the Embar reservoir. Highest productive datum in this reservoir is found at Stanolind's 12-E Shoshone-Arapahoe

TABLE 1—TYPE FORMATIONAL SEQUENCE

Winkleman Dome, Fremont County, Wyoming

Stanolind's 9 Shoshone-Arapahoe Tribal, NE NW NW 19-2n-1w, W.R.M.
Surface elevation: 6,092 ft. kelly bushing.

Geologic formations	Top logged at (ft.)
U. Cretaceous:*	
Dakota	334
Jurassic:	
Morrison	572
Sundance	730
Gypsum Springs	1,012
Nugget	1,190
Triassic:	
Chugwater	1,382
Alcova	1,652
Dinwoody	2,545
Permian:	
Embar (Phosphoria)	2,595
Pennsylvanian:	
Tensleep	2,948
Amsden	3,354
Darwin	3,548
Mississippian:	
Madison:	3,626
Devonian:	
Darby	4,190
Ordovician:	
Bighorn	4,234
Cambrian:	
Gallatin	4,458
Gros Ventre	4,707
Flathead	5,340
Pre-Cambrian:	
Granite	5,673
Total depth	5,675

*Cretaceous outcrops of Mowry and Thermopolis formations.

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WORLD-WIDE EXPERIENCE

CENTRAL TANK BATTERY installation at Winkleman dome field, Wyoming. Tensleep tank batteries appear in foreground and Embar tank battery at right background. Service Pipe Line Co. pumping station may be seen behind Tensleep battery.

Tribal, NE NW NW 19-2n-1w, W.R.M. with a datum of plus 3,586 ft. Among the lowest wells structurally is Stanolind's 17-E Shoshone-Arapahoe Tribal, NE NW SW 18-2n-1w, W.R.M. which has a datum of plus 3,064 ft. (See Fig. 2). Nine wells have been completed from the Embar with an average daily production of 1,500 bbl. of oil.

Productive closure in the Tensleep reservoir exceeds 550 ft. Highest productive completion in the Tensleep is Stanolind's 20-T Shoshone-Arapahoe Tribal, (total depth 3,180 ft.) with a datum of plus 3,282 ft. One of the lowest wells structurally is Stanolind's 7-T Arapahoe Tribal, (total depth 3,375 ft.) with a datum of plus 2,953 ft. Nine wells have been completed in the Tensleep reservoir with an average daily production of 2,600 bbl. per day.

Development History

First shallow drilling exploration at Winkleman dome was conducted during 1918-1920 by Sage Creek Petroleum Co., which drilled two shallow dry holes on top of the highest closures in the surface outcrops. The firm's first test 1 Shoshone-Arapahoe Tribal, SE SW SW 18-2n-1w, W.R.M. found a showing of gas in the Lakota, and an oil and gas show in the Sundance; however, it was abandoned as dry at a total depth of 970 ft. The other shallow test was its 2 Shoshone-Arapahoe Tribal, SW SE SW 18-2n-1w, W.R.M., also a failure.

Commercial oil production was not established on the dome until February 1944, when Stanolind completed a Tensleep oil well pumping 336 bbl. of oil per day. This was the 1 Shoshone-Arapahoe Tribal, SW SE SW 18-2n-1w, W.R.M.

Deepest test drilled on the dome reached a total depth of 5,675 ft. It penetrated 2 ft. of pre-Cambrian granite rocks encountered at 5,673 ft. It is Stanolind's 9 Shoshone-Arapahoe Tribal, NE NE NW 19-2n-1w, W.R.M. which was drilled slightly east of the highest structural position on the dome. (See Table 1).

Drilling Practices

R. L. Manning, Inc., Denver, drilling contractor, has a 4,000-ft. rig operating for Stanolind in the field. This rig is powered by two engines. Mud pumps are two 7¼ by 12-in. with an independent drive on the No. 2 pump. The 96-ft. 437,000-lb.-capacity mast is mounted on a 5-ft.-high substructure.

Contractor cuts an 8¾-in. hole to the top of the Embar formation where 7-in. pipe is set and cemented with 400 sacks of cement. Hole is reduced to 6⅛ in. and carried to total depth. About 15 days are required to drill a 3,000-ft. test to the Embar formation.

Crooked-hole problem . . . Difficulty in controlling crooked holes comprises the major drilling problem at Winkleman dome. In one particular well, a maximum deviation of 5° was logged at a depth of 2,100 ft. in Cretaceous formations, and an average deviation of 4° was recorded throughout the course of the bore-hole to 3,145 ft., total depth.

Despite marked crooked-hole tendencies, only 10 rotating days, 13 net days, and 17 over-all days and 25 rock bits were required to reach contract depth mentioned above.

Over-all pentration rates of 16.6 ft. per hour and 181 ft. per hour were recorded from one well in cutting 8¾-in. long hole.

TABLE 2 BORE-HOLE, CASING, AND CEMENTING PROGRAM

Winkleman Dome, Fremont County, Wyoming

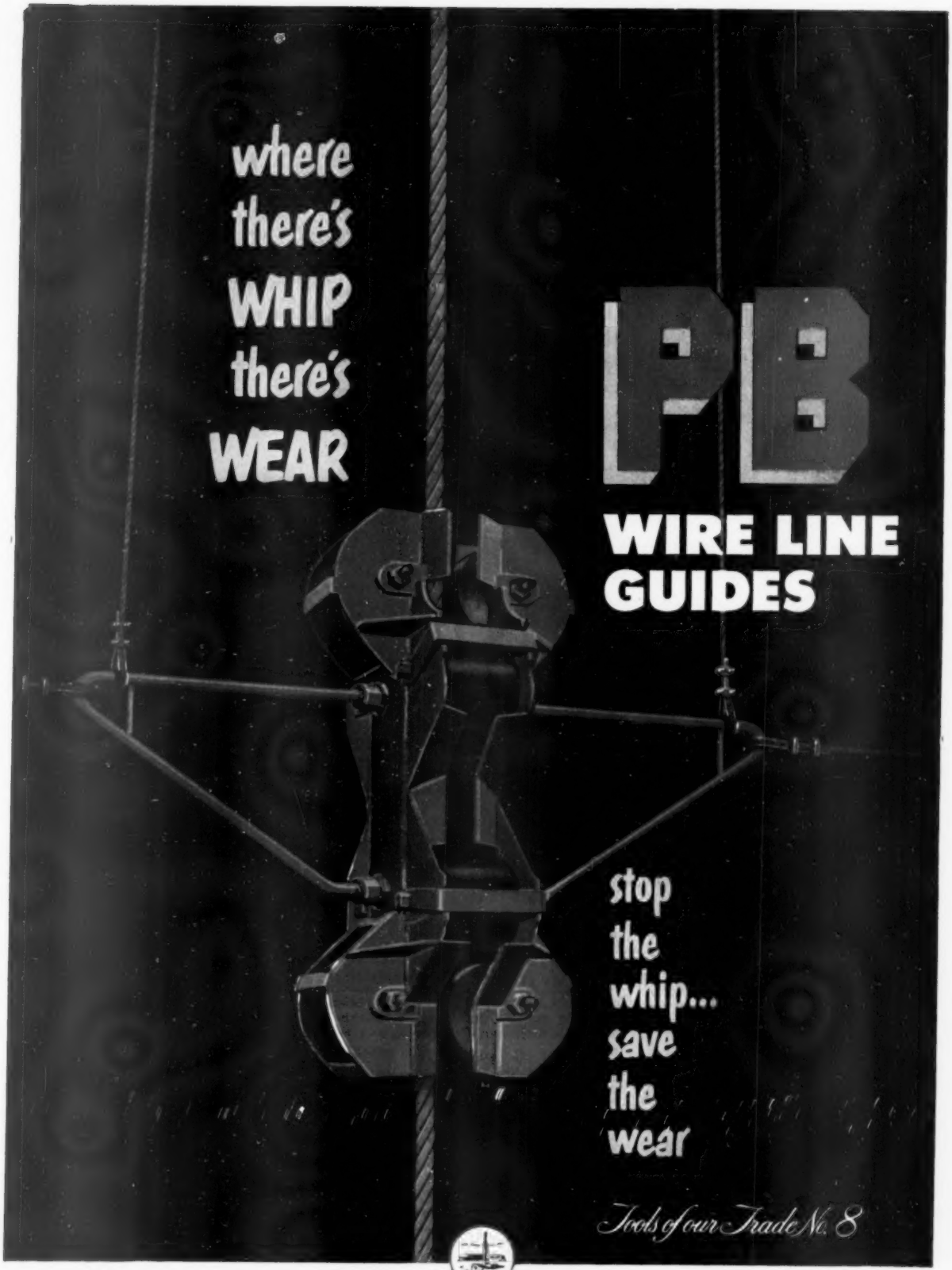
	Surface string	Long string
Bore-hole diam. (in.)	11	8¾
Casing diam. (in.)	9⅝	7
Casing seat (ft.)	232	2,655
Cement (sacks)	150	400

Well Stimulation

Successful treatments with a fracturing process have been experienced on four oil wells in the Embar reservoir to date. These treatments consist of injection of 4,000 gal. of gel acid accompanied by 4,000 lb. of sand (1 lb. of sand per gallon) followed by injection of from 6,000 to 8,000 gal. of regular acid.

Selective treatment calls for separate treatment of the lower and the upper portions of the Embar formation. The lower portion is first treated under the open-hole packer, sealed off, then followed by treatment in the upper portion through a straddle packer.

TYPICAL PUMPING-UNIT installation at Winkleman dome field. This 32-hp. unit is at Stanolind's 18-E Tribal, which drew an initial potential of 358 bbl. of oil per day.



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TEXAS

EAST TEXAS

Second Producer For Henderson Pool

The new South Malakoff field in Henderson County, 5 miles southeast of Trinidad, received a confirmation well northeast of the pool discovery. Delta Drilling Co. 1 May Hustead was perforated in the Bacon limestone section (lower Glen Rose) from 7,496-7,506 ft. and completed for 128 bbl. of 47° oil a day through ⅜-in. choke.

The same firm's 1 Foster opened the pool, flowing 347 bbl. daily from Bacon limestone at 7,510-20 ft.

Harrison County . . . A new Pettit pool or a 2-mile west extension to Blocker field was in the making at Stanolind Oil & Gas Co. 1 Anna Bates, south of Marshall. After fracturing at 5,555-60 ft. the well gaged 2,600,000 cu. ft. of gas a day, plus an undisclosed amount of distillate. This well is separated from Blocker field by a dry hole which Stanolind drilled as 1 Cole in 1945.

Carthage extension . . . Hudson Oil & Gas Co. 1 Furrn, 8 miles southeast of DeBerry in Panola County, was showing for a 1-mile east extension to gas production. A test on Pettit perforations at 6,064-94 ft. gaged 400,000 cu. ft. of gas daily, and a gage on Travis Peak perforations at 6,664-76 ft. through the same choke was 1,300,000 cu. ft. daily.

Anderson County new pay . . . Byrd Oil Corp. 2 Springer has added a second pay zone to Neches-Woodbine field, 4 miles northeast of Neches townsite. Potential was 200 bbl. of 31° oil a day through 12/64-in. choke from perforations in the sub-Clarksville at 4,572-78 ft. Humble Oil & Refining Co. 2 Bowers, developed 3,000 ft. of free oil on drill-stem test in the sub-Clarksville at 4,498-4,540 ft.

NORTH TEXAS

Discoveries in Taylor County

Discovery completions reported included a gas-distillate well in northeast Taylor County, and a lower Gardner sand well as a new pay for the area 2½ miles east of Bradshaw.

The gasser was Lester & Duffield 1 Wendell Foreman, 4½ miles northeast of Abilene. A 24-hour test on perforations from 3,954-62 ft., ½-in. choke, registered 8,300,000 cu. ft. of gas a day plus 50 bbl. of 72° oil. Top of pay was 3,952 ft. on elevation of 1,774 ft.

G & C Drilling Co., Muleshoe, 1 Bill Graham completed as a lower Gardner discovery, east of Bradshaw. Potential was 434 bbl. of 41° oil a day through 20/64-in. choke from perforations at 4,261-69 ft. Top of pay was 4,261 ft. on elevation of 1,929 ft. The same operators will drill a west offset as 1 Guy Gannaway.

Montague County . . . New conglomerate oil 6½ miles southeast of Ringgold, 2 miles east of similar production, has been opened by Batex Oil Co. and Arnold H. Bruner & Co. 1 Fowler. The well flowed 210 bbl. in 12 hours through 24/64-in. choke from perforations at 6,075-79 ft. Top of the Caddo was picked at 5,936 ft. and MicroLog indicated 21 ft. of potential pay section. Oil and gas shows were also found in the Strawn around 5,493-5,510 ft.

New pay . . . Arnold H. Bruner 1 Gregory, W. S. Payne Survey, opened Strawn pay in the Kennedy-Caddo field. A flow test on perforations at 5,940-45 ft. gaged 85 bbl. of oil in 11 hours.

Extension . . . Jack Grace Production Co. 2 Boedecker, 6 miles southwest of Bowie, J. Diaz Survey, A-183, flowed 142 bbl. of 42° oil a day through 32/64-in. choke, from conglomerate pay at 5,862-74 ft. The well had oil recovery on tests from 5,858-5,998 ft.

Nolan County . . . Caddo production in the North Dora-Ellenburger field has been opened at U. S. Smelting, Refining & Mining Co. 1-C TXL "A." On potential test the well rated 236 bbl. of oil a day through 34/64-in. choke, from perforations at 5,870-88 ft. Location in 59-20-T&P Survey is 3 miles southwest of similar production in White Flat field.

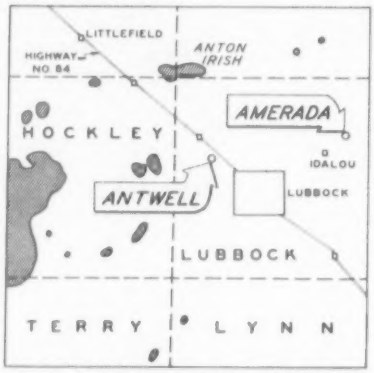
WEST TEXAS

Second Well Is Flush Producer

Importance of Warren Petroleum Corp.'s new Pennsylvanian pool in southwest Midland County was enhanced considerably last week when the firm completed its second test, a north offset to the discovery.

Warren opened the pool upon completion of 2 Sanders, which flowed 60 bbl. of oil a day from Pennsylvanian pay topped at 10,780 ft. Warren 1 Sanders, the north offset, was drilled to the Ellenburger, which showed oil on drill-stem tests, but plugged back to the Pennsylvanian when mechanical trouble developed. On potential test from perforations at 10,450-10,470 ft. the well flowed 392 bbl. of oil in 8 hours through ¾-in. choke, and was given a daily potential of 1,176 bbl.

The new pool, suggested name War-San, in the fourth Pennsylvanian find between Pegasus and Parks fields.



Antwell 1 Elliott, northwest of Lubbock, found oil shows in the Clear Fork. Amerada 1 Peoples, northeast of Lubbock, is a location.

Clear Fork show in Lubbock County . . . Morris R. Antwell 1 Elliott, south of highway 84 between Shallowater and Lubbock, developed clean oil and heavily oil-cut mud on a 2-hour drill-stem test of the Clear Fork at 5,522-68 ft. Top of the section was reported at 5,443 ft., minus 2,180 ft. Recovery on the test was 5 ft. of clean oil, 30 ft. of half mud and oil, 90 ft. of gas-cut mud and 90 ft. of water-cut mud. Operators were drilling ahead to retest.

Amerada Petroleum Corp. has filed application for a 7,000-ft. wildcat to be drilled 6 miles northeast of Idalou, in northeast Lubbock County. The well will be 1 Laura Peoples, in Section 133, Block C, EL&RR Survey. Tide Water Oil Co. and Sinclair Oil & Refining Co. hold offset leases.

Dawson County . . . Murphy Corp. 1 Walls, 3 miles east of Lamesa, was waiting on pumping equipment after swabbing and flowing oil from the Wolfcamp between 8,596-8,646 ft. Swabbing recovered 69 bbl. of new oil with no water. A second acid treatment increased the yield to 8 bbl. an hour for 6 hours, when it kicked off and flowed 17.3 bbl. in 5 hours through 14/64-in. choke, then died. Total depth was 9,005 ft.

SOUTHWEST TEXAS

Queen City Sand Produces In New Clayton Discovery

First oil production, and a new producing horizon, Queen City sand, have been opened in Clayton field, 7½ miles west of George West, in western Live Oak County.

Discovery well, 1 Great Southern, drilled by Herring & Grimes Oil & Gas Co., flowed 116 bbl. of 43.6°-gravity oil per day through ¼-in. choke, gaging 100-psi. pressure on the tubing. Gas-oil ratio was 367 cu. ft. per barrel.

Previous production at Clayton, discovered in 1948, has been gas and condensate from Wilcox sands.

Oil Production Opened In New Atascosa Area

A new oil-producing area, located 5 miles west of Charlotte, in Atascosa County, has been established by Carter & Carter with completion of their 1 Prassel, a wildcat test in W. W. Robbins Survey 116.

Producing from Navarro sand in open hole at 4,695-4,735 ft., the discovery well flowed 80 bbl. of oil per day through ⅛-in. choke on completion gage.

Location is 2 miles south of Sutton field, nearest production, which also is from Navarro sand. Kyote field is 5 miles to the northwest.

TEXAS GULF COAST

Harris County Wildcat Completed as Producer

A new oil-producing area has been opened in western Harris County with completion by Russell Maguire and R & S Oil Co. of their 1 John Sweeney estate, a wildcat in the W. Williamson Survey, rated good for 90 bbl. of 40.7°-gravity crude per day, flowing through 7/64-in. choke with 1,800-psi. pressure from perforated sand interval at 6,866-68 ft. Gas-oil ratio is 3,667 cu. ft. per barrel.

Location is 8 miles west of Fairbanks and about 15 miles west of Houston. Nearest other production is in Joyce Richardson field, 1¾ miles to the west.

Oil Production Proved in Second North Rowan Well

Texas Eastern Production Corp. has proved a new pay zone, productive of oil, in the North Rowan area, 4 miles southwest of Alvin, in Brazoria County, where its 1 North Rowan Unit 2, second test for the area, has been completed flowing 61.52 bbl. of 43.5°-gravity oil per day from a sand interval at 9,572-78 ft.

The area's discovery well, completed last July by R. L. Daniels and M. W. Messer, was a gas-condensate producer from a deeper Vicksburg sand at 10,815-29 ft. It had a calculated open-flow potential of 101,000,000 cu. ft. of gas daily with 32 bbl. of high-gravity condensate per million cubic feet.

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Gas-oil ratio of the new well, located 1,800 ft. east of the discovery well, is only 694 cu. ft. per barrel.

North Rowan is slightly more than a mile northwest of the original gas-condensate-producing Rowan area.

KANSAS

New Pools Opened

Five new discoveries have been completed in Kansas. In McPherson County Octace LeBlanc finaled 1 Unruh, SW SW SW 21-19s-2w, for a pump potential of 158 bbl. of oil per day from the Mississippi. In northern Kansas Sohio Petroleum Corp. completed 1 Krause, SE SE SE 1-4s-19w, Phillips County, for a potential of 408 bbl. of oil per day from the Lansing.

On the Central Kansas uplift in Rooks County K&E Drilling Co. and L. B. Stableford completed 1 Ondrasek, SE NE SW 4-10s-19w, for a potential of 110 bbl. of oil per day from the Arbuckle. Rush County has a new pool at Tatlock Oil Co. 1 Peterson, SW SW SE 36-19s-16w, completed for 500 M.c.f. of gas per day from the Arbuckle, open flow. Stafford County's new strike is Natural Gas & Oil Corp. 1 Crissman, NW SW SE 14-23s-14w, completed for a potential of 43 bbl. of oil per day from the Lansing.

Committee Names Pools

The Nomenclature Committee of the Mid-Continent Oil and Gas Association has named 11 new discoveries in various Kansas counties.

Central Kansas uplift . . . Barton County has a new oil pool at H&H Drilling Co. 1 Button, SW NE NW 35-19s-15w. It opens Clarence Northwest pool with production from the quartzite. On the northeastern flank of the uplift in Phillips County Sohio petroleum opened Mont-Sol pool at 1 Krause, SE SE SE 1-4s-19w. Production is from the Lansing.

Allphin Northwest pool is a new pool in Rooks County at Heathman Seeligson 1 Wait, NW NW NE 23-10s-20w. It is completing in the Arbuckle. Glen pool in Stafford County was opened by Natural Gas & Oil Corp. at 1 Crissman, NW SW SE 14-23-14w. It is a Lansing producer.

Southern Kansas . . . Sumner County's new pool is Murphy Southwest at Martin & Cash 1 Smith, SW SW NE 13-35s-2e, completing in the Cleveland sand. Cowley County has a new pool, Nitsche, at Royal Oil & Gas Corp. 1 Nitsche, SE SE SE 24-32s-6e, completing in the Layton sand.

Sedgwick basin . . . Kingman County has two new pools. Banta pool was opened by Frank Purcell at 1 Banta, SW SW SW 34-30s-8w, a Mississippian producer, while Banta Northeast pool was completed by Pickrell Drilling Co. 1 Boyle "B," NW NW NE 34-30s-8w, another Mississippian producer.

Eastern Kansas . . . Butler County's new pool is Fox-Bush West, opened by Rex & Morris 1 Young, NW NE NE 15-29s-5e, a Bartlesville sand producer.

Hugoton area . . . In Seward County Kismet Northwest pool was opened by Columbian Fuel Corp. at 1 Rinehart, C NE SE 10-33s-31w, as a Morrow sand gas discovery well.

LOUISIANA

NORTH LOUISIANA

Five Producers Finaled In New Roseland Field

Concordia Parish's new Roseland field has five producing wells, one test waiting for pump, and one new location staked.

The field was opened last summer at Carter Oil Co. 2 Orrin James, 26-4n-9e. The latest new well in the field is Carter's 3 Frank Whorton. It was completed flowing 211 bbl. of 47.5°-gravity oil daily through 10/64-in. choke from Wilcox sand perforations at 6,667-70 ft. It is in irregular section 25-4n-9e. Roads are under construction for 4 Whorton, a new field test in Irregular Section 23-4n-9e.

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OKLAHOMA

Garfield County Has New Misener Strike

Carter Oil Co. has run casing for a new Misener sand discovery in the SW SE NE 29-24n-4w, Garfield County. The 1 Sarkey flowed an estimated 750 M.c.f. of gas and oil at the rate of 5 bbl. per hour on drill-stem test of two intervals in the Misener sand. The second test flowed 750 M.c.f. of gas per hour and 4 bbl. of oil per hour, then increasing to 2,500 M.c.f. per day and 2 bbl. of oil per hour.

New Producer Added In Southeast Little Chief

Osage County's Southeast Little Chief pool has a good new producer at Gross Producing Co. C-9 Osage, SW SW SE 13-25n-6e, on the west side of the field. It was completed for a flow of 55 bbl. of oil per hour through ¾-in. tubing choke after treatment of open hole at 4,817-42 ft.

The fourth dry hole was also completed in the field, the second on the northwest flank of the pool just north of good producers. There are 17 producing wells in the field.

Bromide Show at Garvin Confirmation

Magnolia Petroleum Co. has a Bromide show at a confirmation test to a new pool southeast of Maysville in Garvin County.

Recovery netted 130 ft. of mud-cut oil, 210 ft. of oil and gas-cut mud and 90 ft. of water on a drill-stem test at the 1 Abernathy, SE NW NE 3-3n-2w, from 6,289 to 6,332 ft. This test is the offset to Gene Goff's 1 White in SE SE NW 3, a Viola lime producer at 5,907-6,007 ft.

Garfield Discovery to Make Production Tests

Production tests are being run at Carter Oil Co. 1 Skarkey, Garfield County wildcat in the SW SE NE 29-24n-4w.

The discovery flowed 231 bbl. of load oil in 19 hours from the Misener sand at 6,130-49 ft. The well is 1 mile southeast of South Hunter pool, separated by a dry hole.

Pawnee Strike Finaled

Signal Oil & Gas Co. 1 Endicott, NE NE NW 34-23n-5e, Pawnee County, is a new first Wilcox discovery and the southeast offset is nearing critical depths.

The pool opener flowed 140 bbl. of oil in 18 hours through 15/64-in. choke from perforations at 3,478-98 ft. Oil is 42° gravity. The offset well is the A. D. Krow and Signal 1 Endicott, SW NW NE 34.

Garvin-McClain Activity

Shell Oil Co. has completed 3 Doc Cole in Garvin County's Royal pool. The well flowed load oil and flowed 91 bbl. of oil hourly for 3 hours on 1-in. choke. The Arbuckle was topped at 3,387 ft. The well is in SW SE SE 6-1n-3w.

In McClain County Sinclair Oil & Gas Co. finaled 1 Newcomb unit in the C NE SW 17-5n-4w, flowing 718 bbl. of new oil in 13 hours with 1,356 M.c.f. of gas. The Northwest

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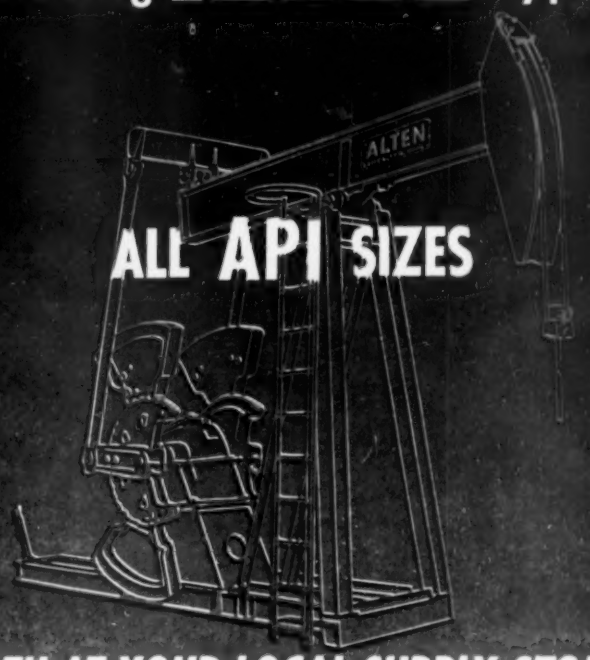

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Lindsay pool well produces from perforations at 11,172-192 ft. in the second Bromide sand and 11,268-284, and 11,305-338 ft. in the third Bromide sand. Flow was through ⅜-in. tubing choke.

CALIFORNIA

Casing Set in Deep Beverly Hills Test

Universal Consolidated Oil Co. bottomed its deeper-zone test in old Beverly field at 8,562 ft. and has set 7-in. casing at an undisclosed depth. Testing of several potential oil sands reportedly encountered by the wildcat was under way at the first of last week.

The wildcat is located on studio property of 20th Century-Fox in Beverly Hills. Should the test prove successful, development of the new pool will be from the drilling island adjacent to Wilshire Boulevard.

New Leda Sand Pool For Guijarral Hills

Union Oil Co. completed its northeast step-out to Guijarral Hills field, Fresno County, as a 1,250-bbl. per day producer of 37°-gravity crude. Production was from the Leda sand, of Lower Miocene age, at 8,810-52 ft. The test is believed to have uncovered a new pool although it is only ½ mile north of the nearest Leda producer. After having been on production several days, Union 27-26 Spieler was continuing to flow more than 1,000 bbl. daily through a 30/64-in. choke.

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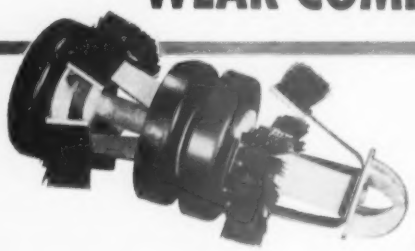

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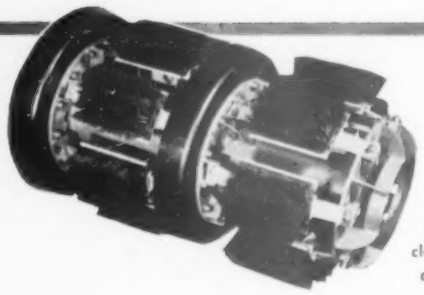

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Fillmore Test Redrilling

Standard Oil Co. of California was again redrilling its deep test near Fillmore, Ventura County, after having set 9⅝-in. protection string at 10,997 ft. First drilled to 14,503 ft., 1 Sespe Ranch was plugged back and redrilled to 14,000 ft. Shows encountered in the second hole, reportedly gas and condensate, resulted in the current hole being drilled from below 11,000 ft. A depth of almost 11,600 ft. had been reached at last reports. Drill site is in SW SW 27-4n-20w.

Bandini Outpost Testing

General Exploration Co.'s ½-mile southeast outpost to its Miocene sand discovery near Bandini, eastern Los Angeles, was experiencing difficulty in securing a water shut-off. A recementing job was performed at 6,230 ft. If successful, 2 C.C.M.O. was to be completed in the 65 ft. of net oil sand encountered between 6,180 and 6,285 ft. Drilled to 7,072 ft. the wildcat had been plugged back to 6,365 ft. before 7-in. casing was set.

APPALACHIAN AREA

PENNSYLVANIA

In Monroe Township, Bedford County, Southwest Pennsylvania, John Galey has located 1 Donald H. Miller, wildcat, elevation 1,000 ft., Clearville Quadrangle, 4.90 miles south of latitude 39 degrees 55 minutes and .86 miles west of longitude 78 degrees 20 minutes. Buffalo Township, Washington County, 1 Kelly - Southerland encountered a show of water at 7,130 ft., 37 ft. in the Oriskany sand and is drilling at 7,155 ft.

WEST VIRGINIA

In Glade district, Webster County, West Virginia, Nelson W. Taylor et al, announced 1 Audra and Harold Crites, wildcat, elevation 2,376 ft., Cowen Quadrangle, .21 mile south of latitude 38 degrees 25 minutes and 2.57 miles west of longitude 80 degrees 30 minutes. Roaring Creek district, Randolph County, Seneca Gas & Oil Co., staked 1 Thomas J. Cain et al, elevation 2,449 ft., Sago Quadrangle, .75 mile south of latitude 38 degrees 55 minutes and 1.40 miles west of longitude 80 degrees 00 minutes and Nelson W. Taylor, agent for Edmund J. Fitzgerald et al, made 1 M. J. Ford, elevation 2,655 ft., 2.29 miles south and 2.20 miles west of this latitude and longitude.

OHIO

A small oil play is underway, partly on town lots, at the north end of Seneca Lake in Richland Township, Guernsey County. Eight shallow rigs are drilling to sand and shale sections at depths ranging from 450 ft. to 700 ft., averaging around 50 ft. of formation with scattered pays. Initial productions vary from 2 bbl. to 200 bbl. per day with wells being produced natural.

Another large well was added to Rine pool in Pike Township, Coshocton County. National Gas 7 D. G. Rine Section 4, logged the Clinton at 2,963-3,021 ft. and made 500 bbl. in 24 hours after fracturing.

INDIANA

In Warrick-Spencer counties Truman Drake 1 Johnson, 36-4s-6w, Warrick County and W. K. Snyder 1 Russell Huff, an east offset over in Spencer County have found good

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O'Hara lime saturation at about 1,175 ft. South of these tests ½ mile Hoosier Development Co. is making 40 bbl. of oil per day from the Aux Vases at 1 Frake heirs.

ROCKY MOUNTAIN

ARIZONA

Shows Found at Apache County Wildcat

Shell Oil Co. recovered oil and gas-cut mud and water on test of Hermosa at 1 Navajo, C SE SE 6-41n-29e, Apache County in extreme northeastern Arizona. Recovery on test of the zone 4,619-70 ft. was 100 ft. of slightly gas and oil-cut mud.

A second test 4,670-4,772 ft. recovered 300 ft. of slightly gas and oil-cut mud, 450 ft. of gas, oil and water-cut mud with hydrogen sulfide odor, and 400 ft. of gas, oil and mud-cut water. The tool was open for 2½ hours and there was inflammable gas at the surface after 1 hour, with blow too small to measure. Flowing pressure was 200-600 psi.

The well is the first in this state for the operator following acquisition of substantial amounts of acreage in Arizona and Utah at Indian land sale about a year ago. The wildcat is located in the Black Mesa basin, a relatively unexplored province, and southeast of production in Boundary Butte field in southeastern San Juan County, Utah. Shell is coring below 4,941 ft.

WYOMING

Two Deep Tests for Wind River Basin

A test to basement in Beaver Creek field, Fremont County has been announced by Stanolind Oil & Gas Co. The company will drill 32-M, NE NE SE 10-33n-96w, about ½ mile northwest of its recent Madison discovery in this field. Stanolind's recently completed deep test was completed for a flow of 341 bbl. of oil per day from Madison, and the current location will serve both as a confirmation to that discovery and as the first investigation of Devonian, Ordovician and Cambrian possibilities of the field.

In the Big Sand Draw Unit, also in Fremont County, Sinclair Oil & Gas will deepen 15 Unit, NW NW SE 10-32n-95w to test Madison. Present depth is 7,010 ft. and Madison is expected at about 7,750 ft. This field has not previously been tested to this formation.

Tensleep Discovery Completed in Dickie Unit

Stanolind Oil & Gas Co. has completed 2 Unit, NE NE NE 26-45n-101w as a Tensleep producer for a gage of 90 bbl. of oil per day on pump. The well is about 1¼ miles north of the Phosphoria discovery which was the first test of the unit. The earlier discovery produced at the rate of 290 lb. of oil per day, flowing.

New Niobrara, Weston County Discoveries Indicated

Vickers Exploration Co. has run casing and is preparing to test 13 ft. of apparently productive sand at 1 Government, C NE NE 32-41n-66w, Niobrara County. The well found shows in the zone 7,643-56 ft., in Newcastle sand. The well is 2 miles northeast of the recent discovery by Cosden Petroleum Co., R. L. Manning and Wind River Oil Co. which established the first production from Newcastle in this county, and was the first successful extension of the active Weston County trend this far south. It is the third producer indicated for northern Niobrara County in recent weeks.

West of previous production in Weston County, Dakamont Exploration Co. is unofficially reported to have found 4 ft. of saturation in Newcastle at 1 Government, C NE SE 21-41n-67w. Total depth is reported as 8,157 ft., but the well is a tight hole and no official data is available.

Two Johnson County Discoveries Completed

The Texas Co. has completed a Shannon sand gas discovery in Dugout field, Johnson County. The well 2 Government-Halm, SE SW SW 35-43n-80w, flowed at the rate of 35 million cu. ft. gas per day from perforations 2,778-2,802 ft. Top of Shannon was found at 2,764 ft. The well offsets oil production in the field and was completed as a shut in gas well.

Union Oil Co. of California has completed its deep Sussex sand discovery in the Powell Unit, Converse County. The well, 1 Unit, C SE SE 29-40n-73w, flowed at the rate of 40 bbl. of oil and ½ million cu. ft. of gas per day from Sussex at 9,501-26 ft. Total depth was 11,684 ft.

MONTANA

North Sidney Wildcat Running Casing

Sun Oil Co. and others are running casing at 1 Beagle Land & Livestock NE SW SW 17-23n-59e, in the North Sidney area of Richland County. The well is bottomed at 9,413 ft. It was originally scheduled as a 13,000 ft. test to Ordovician which produces in the Brorson area to the northwest. If not successful in Madison the well will be continued to the original objective. The operator cored a substantial section of Madison with shows. A drill-stem test 8,906-9,026 ft. recovered 900 ft. of slightly oil and gas-cut water cushion, 1,080 ft. of very highly oil and gas-cut drilling mud, and 2 gal. of free oil. This zone, with others which appeared hard and tight will be acidized and tested.

Dawson County Wildcat Logs Silurian Show

Stanolind Oil & Gas Co. recovered 55 ft. of high 44°-gravity oil on drill-stem test of Silurian 10,332-10,358 ft. at 1-E NPRR, C NE SE 21-20n-53e in the North Bloomfield area of Dawson County. In adidtion the 4-hour test recovered 195 ft. of oil, gas and mud-cut water and 2,000 ft. of water cushion. The operator is coring below 10,388 ft. at the well, which is scheduled to go to Cambrian at about 11,000 ft.

COLORADO

Washington County Discovery Indicated

Continental Oil Co. tested oil at the rate of 43 bbl. per hour from "D" sand at 1 Selby, NE NE SW 9-1s-56w, in the Bijou View area of Washington County. The discovery is 2 miles northeast of previous production in Little Beaver field, and separated from its by previous unsuccessful drilling. The company reported a total of 20 ft. of apparently productive "D" sand. The well found "J" sand wet, and will run casing for completion in "D" sand. The area is about 4 miles west of the town of Woodrow, and has had little previous drilling. Exploration in the Little Beaver area was heaviest to the south and west, with but little exploration done northeast of production.

Second Baca County Gas Producer Testing

Southwestern Exploration Co. recovered gas at the rate of 4,500 M.c.f. per day on test of 1 State "B," NW NW SE 16-32s-41w, Baca County. The well is 3 miles north of a previous success in this county which was considered an extension to Greenwood gas field in Morton County, Kansas. The new well is the second success in the county. Total depth was 3,503 ft. and plug back is 3,151 ft. The recovery of gas was from the zone 3,136-51 ft. Tops have not been reported, but production is identified as from Lansing-Kansas City.

UTAH

Brennan Bottom Discovery Completed

Gulf Oil Co. has estimated a potential of 700 bbl. of oil per day at completion of 1 Brennan Bottom, C NE SE 13-7s-20e, wildcat in west-central Uintah County. The well went to 8,000 ft. total depth and produced from Green River at 6,870-7,000 ft. Oil recovered is 34° gravity, with a pour point of 100°, similar to the majority of production in the Uinta basin. On pump actual recovery ran up to 162 bbl. of oil per day with a small water cut.

CANADA

Discovery Rate Lower Than Last Year

The rate of indicated discoveries of oil and gas in western Canada during the first month of 1954 is considerably lower than during that same period 1 year ago, as so far this year there have been only 11 indicated new strikes, compared with 19 that were brought in during January of 1953.

Although the first month of operations in the west showed a decrease in discovery rate when compared with that 31-day period in 1953, there are a number of key wildcats that are currently under way that could easily better last year's performance within a matter of weeks, if results of testing are favorable. Also, currently exploration in western Canada has levelled off during recent months, and it is anticipated that during future weeks and months, that an increase in that phase of the oil and gas industry will take place. (At this time last year there was a slight decrease in exploratory activities).

In 1951 western Canada's oil industry came through with an indicated oil or gas discovery at the rate of one every 3 days, a thousand per cent better than the rate a few years previous, and the best in Canadian oil history. During 1952 the industry bettered its 1951 performance by 50 per cent, racking up an oil or gas discovery every 2 days—a record that still stands for any 1 year. 1953 brought new discoveries at the rate of one

every 2.32 days. January 1954 shows a slight decrease from that, with a rate of one every 2.8 days. Nine of the discoveries chalked up so far in 1954 indicated possibly of commercial oil production, one was a wet gas discovery and the other was a dry natural gas find.

Just under 50 per cent of the new finds were made in Alberta (three with oil, and both the wet gas and dry gas strikes). Saskatchewan yielded three oil finds, while the southern sector of Manitoba gave up that same number of probable oil discoveries. Neither British Columbia or the Northwest Territories have as yet reported any new 1954 strikes.

EASTERN CANADA

Gaspe . . . In the Gaspe Peninsula, the year 1953 saw the drilling of five different wells on four different structures, by Gaspe Oil Ventures of Monteal and associate interests.

On the Galt Brook Dome, blanketed by a 17,698-acre concession, seepages of high gravity, light green paraffin-base crude are found on the southeast and south flanks of the structure. Halfway down the southwest flank, and for some distance along a northwest-southeast fault, several live oil seepages show high gravity, jet black asphalt base crude. The structure is believed to have two distinct oil zones, an upper paraffin base zone and a lower asphalt base zone.

The Continental Oil Co. 1 deep test, on a structural high almost due west of the crest encountered light green paraffin base crude at 2,794-99 ft. porosity tests indicating possibilities of a commercial well by acidization or fracturing. Pending arrival of a treating unit, drilling continued to 3,235 ft.

The 1 asphalt base, on the southwest flank of the same structure was drilled to test a coral reef formation which lies between 4,000 to 6,000 ft. depth north of the fault line. This test encountered gas at 647-650 ft. and heavier showings at 900 and 1,100 ft. and a black, asphalt-base crude with gas at 1,196-1,202 ft. Pending acidization, which might make a small commercial well, the hole has been deepened to 2,055 ft. and is still making oil and gas. Drilling indicates the main asphalt base oil zone lies between present depth and 2,500 ft.

KENTUCKY

EASTERN KENTUCKY

In Big Sandy gas field and in the Pike County sector on Greasy Creek, W. W. Lindsey has completed 1 Virginia Coleman for an open flow potential of 3,500,000 cu. ft. of gas daily from Maxon (Mississippian) sand at a total depth of 2,375 ft.

In Martin County and located on Big Crooked Creek, Gray Eagle Construction Co. have completed 1 W. B. Stepp heirs as a 15-bbl. oil producer from the Maxon sand at a total depth of 1,368 ft.

WESTERN KENTUCKY

A new pool is being developed in McLean County in section 9-N-25, 6miles northeast of Sebree. There are seven oil wells completed, 2 nearing completion and one drilling. There are no dry holes to date. Some of the new field's wells have been good for as much as 696 bbl. per day.

MICHIGAN

Flowing oil at a restricted rate of 32 bbl. an hour from the Trenton during a rather extended flow period, W. C. Taggart had his Washtenaw County discovery well in 40 days and possibly one of the most important discoveries drilled in the state in years.

This new wildcat discovery is at the 1 LeMaster, NW SE SE 1-1s-7e, Salem Township, Washtenaw County. Wildcat is being flowed through a 24/64-in. choke from the Trenton at 4,397 ft., total depth. Pay thickness was reported to be from 43 to 50 ft. Pay is very dolomitic. On earlier flow tests, well produced as much as 50 bbl. of oil in 15 minutes, and over a 90-minute period well produced 97 bbl. But during this 1½ hour, well was unattended and flow bean was found to be plugged up and well not flowing when checked. It could not be estimated just how long it actually took to flow the 97 bbl. to storage. Oil was tested at 45° gravity and is an amber, near-distillate type crude. Taggart had not released formation tops found at this wildcat and it could only be guessed that the Trenton dolomite pay was probably found below 200 ft. in the horizon. It is also believed that it is less than 400 ft. in the Trenton.

Rotary rig was moved from the 1 LeMaster discovery to a 1946-drilled Trenton test at the 1 Angell, SE NE NW 7-1s-8e, Northville Township, Wayne County, approximately 1 mile to the southeast. Here, Taggart plans to clean out to old Trenton total depth, 4,288 ft. (top of Trenton was logged at this well at 4,137 ft.) and core 90 ft. or more in this objective. This clean-out and deepening operation, with luck, should be completed and well under test in about a week, or less.

The Taggart Trenton oil well is not the first Trenton discovery for the area, but it is the first Trenton oil well discovery in the district. About ¼ mile southwest of the new strike, there is a so-called Salina gas dis-

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covery well which was completed in 1937. This well, which is reported to have carried gas shows in both the Salina-Niagaran and in the Trenton, and is still being produced, was drilled by Lee Brown at the 1 Kehrl, NW NW NE 12-1s-7e. (Michigan Department of Conservation, Geological Survey records credit the 1 Kerhl as a Salina gas discovery. This may not be an accurate evaluation.) The 1 Kehrl logged basal Salina or Niagaran pay at 2,905-15 ft. and well was gaged at this point good for 213,000 cu. ft. of gas a day. Top of Trenton was logged at 3,911 ft. At 4,063 ft., a puff of gas was logged which blew cable tools 200 ft. up the hole. The gas pays, probably both the Trenton and the Niagaran shows, were shot with 120 quarts of nitro and well was given an initial production rating, after shot, of from 304,000 to 310,000 cu. ft. of gas a day. Rock pressure was reported at 1,200 psi.

There are other test wells in the general area, including one in the E½ SW NW 12-1s-7e, which was bottomed out a flat 200 ft. in the Trenton at 4,867 ft., total depth, and was 250 ft. lower on the objective top than the Brown 1 Kehrl. Another shallower test was drilled into the Salina in the NW SE SW 1-1s-7e, just about ½ mile due west of the 1 LeMaster flowing well. This test is located on leases now owned by Taggart. It is expected that rotary tools will be moved to this old hole for rework and deepening when rework at the 1 Angell is completed.

Until the Trenton oil strike in Salem Township, Wastenaw County, there was only one Trenton oil producing pool in Michigan, Deerfield pool, located in Dundee Township, Monroe County (T6S, R6E) where oil was first discovered in 1920, but where the big development did not come until 20 years later. This field is being produced from an upper Trenton pay at about 2,115 ft. There are 350 drilled acres in this area with a per acre recovery, through 1952, of 1,560 bbl. per acre. There were 15 producible oil wells in Deerfield Trenton oil pool at the end of 1952. The new Trenton well is by far the strongest and best oil well drilled to date in Michigan in this horizon, and it is expected that wildcatting with this zone as one of its objective, along the southeastern rim of the Michigan basin, will be very active this year.

WILDCAT COMPLETIONS

SOUTHWEST TEXAS

Atascosa County: Edwin L. Cox 1 Marek, Lot 62, Thornton Ranch Subd., Villarreal Sur. Dry. TD 1,850 ft.

Drilling & Exploration, Inc., 1 Moss et al, Manuel Martinez Sur. 1232, A-553. Dry. TD 2,512 ft.

Neth & Schorsch 1 Foster, J. A. Navarro Sur. 46, A-9. Dry. TD 1,007 ft.

Bexar County: L & N Oil Co. 1 Henze et al, Juan Montes Sur., A-11. Dry. TD 840 ft.

Miller & Pierce 1 Van Petty, Ignacio Perez Sur., A-13. Dry. TD 1,031 ft.

Caldwell County: Herman Whitehurst 1 Witter, Dorothy Benton Sur. Dry. TD 2,253 ft.

Duval County: J. H. Harvey and J. W. Sutherland 1 Dinn, H. K. Allison Sur. 2. Dry. TD 3,500 ft.

Gonzales County: J. J. Elam 1 Davis et al, Winslow Turner Sur., A-76. Shut down. TD 4,025 ft.

Hidalgo County: Stanolind Oil & Gas Co. 1 Henderson, Blk. 16, Riverside Subd., Lino Gavazos Grant, A-57. IP 2,500 M.c.f. daily with 10 BC per M.M.c.f., open flow, upper Frio 8,258-67 ft. (Perforations). TD 9,129 ft. (Extends Landa field.)

Jim Hogg County: George H. Coates 3 Dannelley, CB&CNG Sur. 154, A-272. Dry. TD 2,650 ft.

Killam & Hurd 1 Marrs McLean Trust, Blk. 8, R. Holbein Subd., Las Animas Grant. Dry. TD 1,785 ft.

Charles S. Sollars 1 Marrs McLean Trust, CL Lots 25 and 26, Blk. 20, Las Animas Grant, A-244. Dry. TD 1,796 ft.

Jim Wells County: Calvert & Manley 1 Burns, HT&B Sur. 9, A-233. IP 7,500 M.c.f. daily, open flow, casing perforations 2,506-12 ft. TD 5,226 ft. (New field—West Alfred.)

Nueces County: C. G. Glasscock 1 Wright, Wright Lands Partition, Vicente Lopez de Herrera Grant. Dry. TD 7,600 ft.

Webb County: F. W. Carr 1 Rosa Vela Benavides, Sur. 713, A-1746. Dry. TD 2,690 ft.

Continental Oil Co. 1 Alfredo Trecino, BS&F Sur. 709, A-925. Dry. TD 3,649 ft.

O. W. Killam 2 Walker, CCSD&RGNG Sur. 259. Dry. TD 2,034 ft.

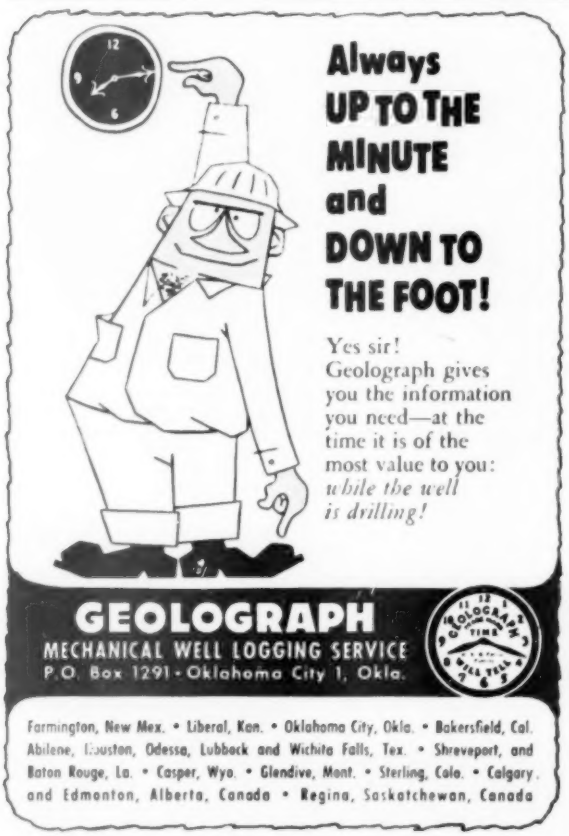
J. C. McCabe et al 1-A Adolph Moos, Blk. 1, CCSD&RGNG Sur. 68. Shut down. TD 2,763 ft.

L. G. Shelly 1 Mil Villarreal, Morris & Cummings Sur. 1090, A-1871. Dry. TD 3,445 ft.

Zapata County: The Texas Co. 170 Jennings, Cerrito Blanco Grant, A-73. IP 5.36 BOPD, ⅛-in., 41.3°, Crockett sand 3,282-98 ft. (Perforations). TD 3,450 ft. (Extends West Jennings and Jennings fields—midway between fields.)

Zavala County: David S. Ring 1 Matthews, I&GN Sur. 32, A-483. Dry. TD 2,912 ft.

David S. Ring 2 Matthews, I&GN Sur. 32, A-769. Dry TD 2,881 ft.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WILDCAT COMPLETIONS

TEXAS GULF COAST

Bee County: W. C. McBride, Inc. 1 Knight, Thomas B. Barton Sur. Dry. TD 7,520 ft.

Brazoria County: Brazos Oil & Gas Co. and Ohio Oil Co. 1 State Tract "C," Alligator Point Gas Unit 1. Dry. TD 6,982 ft.

Ralph E. Fair 1 Furnance, Blk. 23, H&TB Sur., A-231. Dry. TD 8,529 ft.

Union Oil Co. of California 1 Sears, B. C. Franklin Sur., A-192. Dry. TD 11,487 ft.

Colorado County: M. T. Halbouty and Olin Industries, Inc., 1 Johnson, John Love Sur., A-388. Dry. TD 9,215 ft.

Goliad County: M. E. Andrews and Dallas Husky 1 Abele-Rolf, M. Tippen Sur., A-466. IP 22 BCPD and 5,800 M.c.f. daily, open flow, 61.5°, casing perforations 5,388-98 ft. TD 5,500 ft. (New field.)

Harris County: Production Service Oil Corp. 1 Wood, Daniel Harmon Sur., A-315. Dry. TD 7,500 ft.

Newton County: C. B. Webster, trustee, 1 Glidden et al, J. R. Morrison Sur., A-868. Dry. TD 8,125 ft.

Orange County: Kirby Petroleum Co. 1 Lovell heirs, William Stephenson Sur., A-23. Junked hole. TD 9,350 ft.

Glenn McCarthy, Inc. 1 Kurth Trust et al, T&NO Sur. 19, A-196. Dry. TD 8,358 ft.

San Jacinto County: E. C. Johnson Co. 1 Hause Unit, John Foster Sur., A-115. Dry. TD 5,026 ft.

Tyler County: Oil Production Maintenance, Inc., et al 1 Kirby, William Gibbs Sur., A-287. Dry. TD 6,600 ft.

Victoria County: Alaska Steamship Co. 2 Wedmeier, Lemuel Grant Sur., A-170. Dry. TD 5,011 ft.

Washington County: Harry T. Bryant Drilling Co. and Harry W. McCormick 1 Seward, T. Paul Sur., A-97. Dry. TD 8,048 ft.

Wharton County: So Oilwell Service Co and Ralph Liles et al 1 Koehler et al, WCRR Sur. 70, A-448. Dry. TD 5,988 ft.

EAST TEXAS

Anderson County: Fort Bend Oil Co. 1 Adams, Thos. Kinley Sur., A-450. Dry. TD 6,005 ft.

Cherokee County: W. C. Proctor 1 A & M College, T. M. Dement Sur., A-239. Dry. TD 5,191 ft.

Franklin County: John B. Stephens Jr. 1 Campbell, John Humphries Sur., A-215. Dry. TD 7,465 ft.

Tide Water Associated Oil Co. Ramey Unit, J. Maxmillian Sur., 9 miles S Mt. Vernon. IP 42,500,000 cu. ft. gas, plus 148 bbl. 61° distillate per 1,000,000 cu. ft., GOR 6,756 cu. ft., Smackover 12,086-12,341 ft. TD 12,689 ft. Elev. 400 ft.

Kaufman County: J. K. Hughes Oil Co. 1 Eubank, Silas Edens Sur. Dry. TD 5,000 ft.

Morris County: Sohio Petroleum Co. 1 Dutch Love, George Dyer Sur. Dry. TD 5,002 ft. Elev. 304 ft., Woodbine 3,670 ft., Paluxy 4,785 ft.

WEST CENTRAL TEXAS

Callahan County: Johnson & Warren 1 Odom, Sec. 214, P. H. Cammons Sur. Dry. TD 1,847 ft.

Schkade Brothers Drilling Co. 1 Morrisett, 68-14-T&P. Dry. TD 1,776 ft.

Coleman County: Topshe & Crocker 1 Cox, 4-1-HT&B. IP 96 BOPD, 14/64-in., 40°, Gardner sand 3,245-54 ft. TD 3,341 ft.

Eastland County: Victor Cornelius 1 Greiger, 29-2-H&TC. IPP 101 BOPD, 38°, sand 1,266 ft. TD 1,302 ft.

Haskell County: Russell Maguire and Bolin Oil Co. 1 Leonard, S. W. Punchard Sur. 65, A-343. Dry. TD 4,391 ft.

Jones County: C. U. Bay 2-A Dunagan, 16-17-T&P. IPP 26.6 BOPD, 45°, pay 2,750 ft., TD 2,897 ft.

Mineral & Royalty Co. 1 Poe, Blk. 12, L. Kratz Sur. 335. Dry. TD 5,152 ft.

Moutray-Moore Drilling Co. 1-A Sellers, J. Delk Sur. 241. Dry. TD 4,225 ft.

Texas Crude Oil Co. 1 Herbst, Blk. 6, Austin & Williams Sur. Dry. TD 5,810 ft.

Nolan County: Kewanee Oil Co. 1 Adams, 160-1A-H&TC. Dry. TD 6,176 ft.

Kilroy Co. of Texas 1 Roberts, 13-2-T&P. IP 1,293 BOPD, 32/64-in., 52°, Cambrian sand perforations 6,102-17 ft. TD 6,120 ft.

C. L. McMahon, Inc. 1 Hicks, 187-64-H&TC. IP 32.6 BOPD, 13/64-in., 46°, pay 5,162 ft. TD 5,255 ft.

Shackelford County: Dean Brothers 1 Oran Dennis, 43, BAL Sur. Dry. TD 4,477 ft. Elev. 1,392 ft., Ellenburger 4,368 ft.

Lee & Hughes 1 Davis, 6-13-T&P. Dry. TD 1,809 ft.

Stephens County: American Liberty Oil Co. 1-A Lloyd M. Hill, 15-2-SPRR. IPP 11 BOPD, pay 3,305-15 ft. TD 3,315 ft.

Baker & Camp 1 Copeland, James Ervin Sur., A-2193. IPP 12.6 BOPD, 39°, pay 3,144 ft. TD 3,300 ft.

Stonewall County: Alex J. Hickey 1 Diers, Sec. 31, BBB&C Sur. Dry. TD 6,063 ft. Elev. 1,663 ft., Caddo 5,750 ft., Mississippian 6,046 ft.

Sojourner Drilling Co. 1 Beulah Branch 370-2-H&TC. Dry. TD 4,480 ft.

Taylor County: Geochemical Surveys and Robert E. Mead 1 City of Merkel, Blk. 67, Grimes CSL Sur. 147. Dry. TD 2,371 ft.

Sunstar Oil Co. 1-A Campbell 6-18-T&P. Dry. TD 2,380 ft.

Throckmorton County: Bond Oil Corp. 1

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Anderson, Allen Hines Sur., A-208. Dry. TD 5,050 ft. Mississippian 4,750 ft.

NORTH TEXAS

Archer County: Central Exploration Oil Co. & Associates 1 Calvin, Horatio Grooms Sur., A-155. Dry. TD 5,250 ft.

W. A. Lofton and J. B. Revier 2 Prideaux, SA&MG Sur., A-444. Dry. TD 4,025 ft.

Miller & Banks 1 Langley estate, J. B. Hinds Sur., Blk. 10. IPP 32.5 BOPD, 38°, pay 871 ft. TD 882 ft.

Bridwell Oil Co. 1 Conner, Sec. 163, T&NO Sur. Dry. TD 5,141 ft.

Baylor County: Oakland Corp. 1 Higgins, 33-45-H&TC. IPP 44 BOPD, 36°, Noodle Creek sand 1,400-06 ft. TD 1,450 ft.

Clay County: Star Oil Co. 1-B Hopgood, J. Walker Sur., A-700. Dry. TD 6,242 ft.

Cooke County: Texo Co. 1 Blakely, John McDonald Sur., A-765. Dry. TD 2,507 ft.

Denton County: Stubbs-Richker 1 Chapman, N. Coker Sur. Dry. TD 5,005 ft.

Jack County: Blair & Price 1 Myers, E. H. Allen Sur., A-1898. Dry. TD 2,529 ft.

Bridwell Oil Co. 3 Prideaux, Elizabeth Smith Sur., A-524. IPP 16 BOPD, sand pay 621 ft. TD 626 ft.

L. T. Burns 2 Bloodworth, Wm. McDonald Sur., A-380. IPP 68 BOPD, 41°, Strawn 3,812-54 ft. TD 3,856 ft.

Lewis & Lewis 1 Sheppard, Lot 56, Blk. 2, Henderson CSL. IP 150 BOPD, 32/64-in., 42°, conglomerate pay 4,380-4,400 ft. TD 4,412 ft.

Marine Production Co. 1 Lindsey, J. C. Cameron Sur., A-1054. Dry. TD 3,530 ft.

Marine Production 1 Lindsey, J. N. Wright Sur., A-897. IPP 40 BOPD, 38°, pay 2,191 ft. TD 2,196 ft.

Warren Petroleum Corp. 1 Fitzgerald, M. H. Lee Sur., A-373. Dry. TD 5,508 ft.

Weber & Kurtz 1-A Sewell, Blk. 34, Irvine Sur., A-312. Dry. TD 3,525 ft.

Knox County: Texas Pacific Coal & Oil Co. 1 Mamie McFaddin Ward, 199-44-H&TC. Dry. TD 6,521 ft.

Montague County: Brown Drilling Co. 1 Mitchell, A. Buffington Sur., A-31. Dry. TD 6,360 ft.

Merle F. Gunby 1 Melton, Abel A. Lewis Sur., A-420. Dry. TD 6,310 ft.

Youngblood & Foree 1-A McCall, J. A. Morrow Sur., A-919, ½ mile N Engle-Strawn field. IP 288 BOPD, 41°, 12/64-in., conglomerate 6,124-31 ft. TD 6,205 ft.

Wichita County: Ada Oil Co. 1-A Denny, Blk. 27, Cowherd Bros. Subd. IPP 126 BOPD, 40°, pay 4,068 ft. TD 4,143 ft.

Young County: Fortex Oil Co. 1 Dunagan, TE&L Sur. 412. Dry. TD 1,128 ft.

Taubert & Harper 1 Sims, Blk. 629, TE&L Sur., A-787. Dry. TD 3,255 ft.

Woodson Oil Co. 1 McCree, TE&L Sur. 1589. IP 360 BOPD, 12/64-in., 42°, Mississippian 5,025 ft. TD 5,050 ft. 1 mile SE production.

WEST TEXAS

Coke County: Dudley T. Dougherty 1 Willick, Sec. 10, J. H. Gibson Sur. Dry. TD 6,615 ft. Elev. 2,288 ft., Ellenburger 6,464 ft.

Crane County: Forest Oil Corp. 1-A Switzer, 18-1-H&TC. IP 30 BOPD, 12/64-in., 36°, Fusselman 5,107 ft. TD 5,900 ft.

Dickens County: Humble Oil & Refining Co. 3 Matador Land & Cattle Co. "F," Sec. 13, Blk. AB, R. M. Thompson Sur. Dry. TD 7,413 ft. Elev. 2,131 ft., Canyon 5,420 ft., Osage 7,060 ft., Cambrian 7,350 ft.

Ector County: Ohio Oil Co. 1-A Midland Farms, 15-41-T&P. Dry. TD 5,725 ft.

Hockley County: Bankline Oil Co. et al 1-18 Benson, 18-32-Baylor CSL. Dry. TD 6,715 ft.

Plymouth Oil Co. 1 Oldham, 26-27-H&TC. Dry. TD 9,250 ft. Elev. 2,527 ft., Ellenburger 9,204 ft.

Kent County: Giles & Doss 1 Cairns, 51-G-W&NW. Dry. TD 7,071 ft. Elev. 2,282 ft., reef 6,908 ft.

Kimble County: J. Y. Francis 1 Ragland, Sec. 370, William Berry Sur. Dry. TD 2,117 ft. Elev. 1,702 ft., Pennsylvanian 1,790 ft., Ellenburger 1,908 ft.

King County: The Texas Co. 1-A Roy Lebus, Sec. 1, H&GN Sur. Dry. TD 6,016 ft.

Lamb County: H. L. Cain 1 Bundick, Sec. 39, Blk. T. T. A. Thompson Sur. Dry. TD 4,006 ft. Elev. 3,545 ft., San Andres 2,980 ft.

Martin County: Stanolind Oil & Gas Co. 1 University "BO," 44-6-University Lands Sur. Dry. TD 12,335 ft. Elev. 2,919 ft., Pennsylvanian 10,925 ft., Devonian 12,289 ft.

Menard County: C. A. Morris 1 Noble, Sec. 14, Eugene Oleanburger Sur. Dry. TD 650 ft.

McCulloch County: Fannin Drilling Co. 1 Mosely, C. Kellner Sur. 910. Dry. TD 765 ft.

D. W. Richardson 1 Harkrider, Sec. 222, Geo. Fuchf Sur. Dry. TD 601 ft.

Midland County: Warren Petroleum Corp. 2 June Sanders, 38-41-T3S-T&P. IP 60 BOPD, ⅜-in., 41°, Pennsylvanian pay 10,780 ft. TD 10,907 ft. War-San discovery.

Pecos County: Randall Harris 1 McDonald, 28-11-H&GN. Dry. TD 1,370 ft.

Runnels County: Murray Petroleum Corp. 1 Rodgers, Elisha Mather Sur. 535. Dry. TD 4,540 ft. Elev. 1,827 ft., Caddo 4,480 ft.

Schleicher County: Plymouth Oil Co. 1

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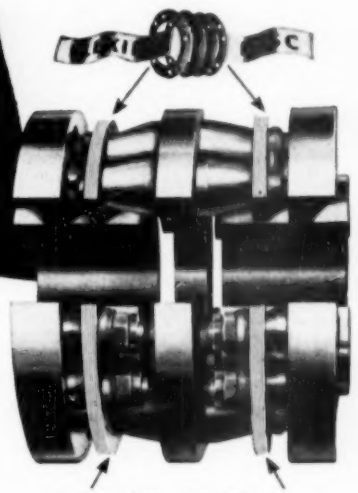

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WILDCAT COMPLETIONS

Thomson estate, 37-A-HE&WT. IP 67 BOPD, ¼-in., Wolfcamp 3,406-10 ft. TD 7,155 ft.

Scurry County: A. K. Turner Jr. and H. J. Zonne 1 Browning, 511-97-H&TC. Dry. TD 2,900 ft.

Sutton County: Tucket Drilling Co. 1 Cowsert, 20-16-TW&NG. Dry. TD 4,425 ft. Elev. 2,391 ft., Ellenburger 4,332 ft.

Yoakum County: Lawton Oil Corp. 1-A McGinty, 454-D-J. H. Gibson Sur. Dry. TD 11,570 ft. Elev. 3,803 ft., Pennsylvanian 9,890 ft., Mississippian (sample) 11,200 ft.

SOUTHEAST NEW MEXICO

Eddy County: Continental Oil Co. 1 East Texas Hills Unit, 1-22s-21e. Dry. TD 10,596 ft. Elev. 4,584 ft., Fusselman 9,432 ft., Devonian 9,437 ft., Ellenburger 10,465 ft.

Lea County: W. H. Black 1 American Republics Corp., 29-19s-33e. Dry. TD 3,339 ft.

Velma Petroleum Co. 1-A State, 29-21s-33e. Dry. TD 4,203 ft.

NEW MEXICO

Rio Arriba County: El Paso Natural Gas 3 San Juan Unit 27-4, SE NW NE 15-27n-4w. IP 600 M.c.f. g.p.d., Mesaverde discovery—new field. Point Lookout 5,833 ft. TD 6,125 ft.

ILLINOIS

Clay County: J. F. McCollom et al 1 Shamhart, SW NE SW Frac. 18-5n-6e. Dry. TD 2,545 ft.

Noah Petroleum Co. 1 Vaught, NW NE NE 25-4n-5e. Dry. TD 2,925 ft.

Clinton County: E. M. Self 1 Hester, SW SE NW 12-3n-1w. Dry. TD 1,364 ft.

Franklin County: Artnell Co. 1 Harrison "B," NW NW NE 32-5s-2e. Dry. TD 2,887 ft.

Montgomery County: Calvert Drilling Co. 1 Blackburn, NW NE SE 8-7n-2w. Dry. TD 3,270 ft.

Randolph County: Wm. F. Seiglar 1 Jerger, NE NE NE 5-4s-5w. Dry. TD 2,319 ft.

Washington County: Dale Hopkins 1 Howe, NE NE SE 3-1s-1w. Dry. TD 1,567 ft.

INDIANA

Clay County: V & E Drilling Co. 1 Myers, SE NE NW 23-12n-7w. Dry. TD 1,573 ft.

Dubois County: Wayne Gayle 1 Salb, SW NW SE 18-1s-4w. Dry. TD 565 ft.

Parke County: N. M. Smith 1 Hoxford, NE NE NW 31-14n-8w. Dry. TD 1,644 ft.

Perry County: H. Meister 1 Stizman, NW NE SE 36-4s-4w. Dry. TD 745 ft.

Pike County: T. Meyers 1 Sargis, NW NW NW 4-1s-7w. Dry. TD 1,380 ft.

KENTUCKY

Webster County: Eakle & Holder 1 Tapp, NW NE NW 16-N-23. Dry. TD 2,740 ft.

MICHIGAN

Cass County: Eros Drilling Co. 1 Tarboss, SE NE SW 23-6s-15w. Dry. TD 964 ft. in Traverse lime.

Kalamazoo County: Ford Oil Co. 1 Bates, SE SW NW 19-3s-12w. Dry. TD 1,373 ft. in Traverse lime.

Newaygo County: Otto Carlson & Max Groom 1 Charles, SW SW NW 23-12n-14w. Dry. TD 2,192 ft. in Traverse lime.

Oceana County: Ford Oil Co 1 Mears, NE SE NE 3-14n-18w. Dry. TD 1,787 ft. in Traverse lime.

St. Clair County: Panhandle Eastern Pipeline Co. 1 Adamski, C NE 2-3n-15e. Dry. TD 2,632 ft. in basal Salina-Niagaran.

Van Buren County: Norman L. Stevens 1 Thornton, SW NW SW 4-4s-13w. Dry. TD 1,236 ft. in Traverse lime.

Washtenaw County: Union Rotary Corp. 1 Kulen Kamp, SE SW SE 19-4s-4e. Dry. TD 1,285 ft. in Traverse lime.

NEW YORK

Oswego County, Volney Township: Lovell Tower et al 1 Rath, Fulton Quadrangle, 5,700 ft. S Lat. 43° 25′, 1,000 ft. W Long. 76° 25′. Dry. TD 875 ft. Utica shale (Ordovician) 700 ft.

OHIO

Carroll County: Natural Gas West Virginia 1 C. A. Ebner, Sec. 18, Brown Township. Dry. TD 5,367 ft. in Clinton 5,170-5,272 ft.

FLORIDA

Calhoun County: Sun Oil Co. 2 Jordan, 32-1n-11w. Dry. TD 4,611 ft. Elev. 159 ft., lower Tuscaloosa 4,330 ft.

SOUTH LOUISIANA

East Feliciana Parish: Nichlos Oil & Gas Co. and Continental Oil Co. 1 Norwood, 83-1s-1e. Dry. TD 10,011 ft.

St. Charles Parish: California Co. 1 Levert, 27-13s-21e. IPP 100 BOPD, 36.5°, casing perforations 10,924-40 ft. TD 11,382 ft. (New field—St. Rose.)

NORTH LOUISIANA

Concordia Parish: Magnolia Petroleum Co. 1 Harris, 18-6n-9e. Dry. TD 7,916 ft.

OKLAHOMA

Beaver County: Ammeco 1 Davis, C NE NE 17-5n-26eCM. Dry. TD 7,012 ft.

Carter County: Sun Drilling Co. 1 Bedford, SW SW SW 33-4s-1e. Dry. TD 4,000 ft.

Grant County: Walter Duncan 1 Baxter, SW SW SW 11-28n-3w. Dry. TD 5,115 ft.

Walter Duncan 1 Forsyth, NE NW SE 21-28n-3w. Dry. TD 5,221 ft.

Jackson County: Phoenix Oil Co. 1 Mathews, SW SW NW 29-2n-20w. Dry. TD 2,520 ft.

Kay County: L. C. Smitherman 1 Means, SW SW NW 30-29n-3e. IPP 19 BOPD, Bartlesville sand 3,289-3,302 ft. TD 3,302 ft. (Oil discovery.)

Lincoln County: Gulf Oil Corp. 1 Jenkins, SE SW SE 6-12n-4e. Dry. TD 5,515 ft.

Arthur B. Ramsey 1 Bray, NE NW SW 14-15n-2e. Dry. TD 5,514 ft.

Davidor & Davidor 1 Neill, SE SE NE 16-15n-3e. IPF 480 BOPD, 37°, ⅛-in., Lower Skinner 4,250-59 ft. TD 5,131 ft. (Oil discovery.)

D&L Oil Co. and R. L. Kemp 2 Hoyt, NE NE NE 17-16n-5e. Dry. TD 3,460 ft.

Noble County: Big Chief Drilling Co. 1 Curtis, NW NE SW 8-21n-2w. Dry. TD 5,535 ft.

Payne County: Don W. Jones 1 Eva May Judge, NW NW NW 21-18n-2e. Dry. TD 4,970 ft.

Pontotoc County: Wm. H. Pine 1 Busby, NW NW NW 21-3n-8e. Dry. TD 1,455 ft.

Pottawatomie County: Midstates Oil Co. et al 1 Harber, NE SE SW 17-7n-3e. Dry. TD 5,343 ft.

Woods County: Champlin Refining Co. 1 Diamond, NE NE SW 17-29n-17w. IPF 14 BOPD, Arbuckle 6,134-52 ft., 1,500 M.c.f. of gas, 26/64-in. TD 6,192 ft. (Opens Yellowstone pool.)

KANSAS

Graham County: Trans Era 1 Bradley-Salms, SW NW NE 19-6s-25w. Dry. TD 4,200 ft.

Pawnee County: M. B. Armer 1 English, NE NE NE 28-23s-15w. Dry. TD 4,180 ft.

Phillips County: Sohio Petroleum Corp. 1 Krause, SE SE SE 1-4s-19w. IPP 408 BOPD, Lansing-Kansas City 3,255-65 ft. TD 3,621 ft. (Opens Mont-Sol pool.)

Stafford County: Natural Oil & Gas 1 Glenn Crissman, NW SW SE 14-23s-14w. IPP 143 BOPD, Lansing-Kansas City 3,651-57 ft. TD 4,044 ft. (Opens Glen pool.)

Sumner County: Morris Mizel 1 Nixon, E½ NE NW 34-30s-1w. Dry. TD 4,064 ft.

Trego County: Barry & Fick 1 Hillman, SW SW NW 7-12s-21w. Dry. TD 4,035 ft.

NEBRASKA

Kimball County: New World Oil 1 Farmer, SW SW SE 5-12n-55w. Dry. TD 6,424 ft. "J" sand 6,384 ft.

NORTH DAKOTA

Morton County, St. Anthony: National Bulk Carriers 1 Anna Miller, C NW NE 20-136n-81w. Dry. TD 5,009 ft. Lodgepole 4,963 ft.

SOUTH DAKOTA

Pennington County, McCarty & Coleman 1 Shull, C SW SW 3-1s-14e. Dry. TD 5,248 ft. Red River 5,167 ft. (?)

CALIFORNIA

Fresno County: Union Oil Co. 27-26 Spieler, SW SW 26-20s-16e, IPF 1,241 BOPD on 2-hour gage, 37° gravity, 35/64-in. choke, Perfs. 8,810-52 ft., TD 9,027 ft. (New Leda sand pool on northeast edge of Guijarral Hills field.)

Kern County: Intex Oil Co. 2 Gill, NW NE 24-26s-27e, IPF 19 BOPD and 150 BWPD, 14.8° gravity, Perfs. 2,133-67 ft., TD 2,167 ft. (New Vedder sand pool in Mount Poso field.)

Oceanic Oil Co. 1-7 C.C.M.O., 7-32s-23e Dry. TD 3,556 ft.

Pacific Oil & Gas Dev. Corp. 71-20 B.A.-Oceanic-U.S.L., 20-31s-24e Dry. TD 5,643 ft.

Superior Oil Co. 38-34 Kernco, SE SW 34-28s-25e, IPF 86 BO in 12 hours, 19/64-in. choke, 35° gravity, Perfs. 11,485-11,517 ft., TD 11,517 ft (Approx. ¾-mile extension to Hebling pool in Rio Bravo field.)

The Texas Co. 1 Unit-B, 16-32s-24e. Dry. TD 5,631 ft.

Union Oil Co. 56-36 Evans, 36-12n-19w. Dry TD 8,150 ft.

Los Angeles County: Hearn Co. 1 Reilly, NW NW 30-2s-10w, IPP 60 BOPD, Perfs. 3,758-66 ft. in upper Miocene sand, TD 3,766 ft. (North extension to Sansinena field.)

Morton & Dolley B-1 Needham, 12-3n-16w. Dry. TD 3,037 ft.

Standard Oil Co. of California 1 Lyons, SE NE 7-5n-16w, IPP 4 BOPD, 41° gravity, Perfs. 1,549-1,685 ft., TD 2,172 ft. (New pool in Elizabeth Lake Canyon area 4 miles northeast of Castaic.)

Orange County: The Texas Co. 1 Dominguez, 19-3s-8w. Dry. TD 4,671 ft.

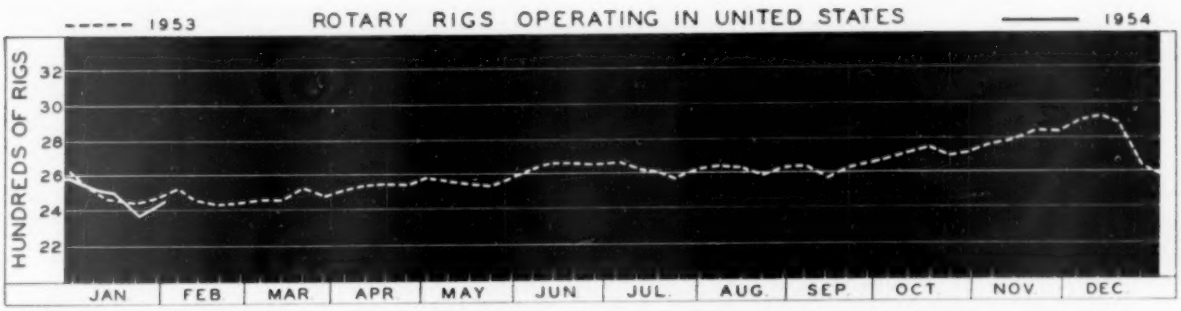
San Benito County: W. W. Holmes, operator 1 Rudolph, NE SE 4-18s-9e, IPP 15 BOPD, 26° gravity, Perfs. 1,073-1,198 ft., OWDD, TD 2,614 ft. (Extension to Bitterwater field.)

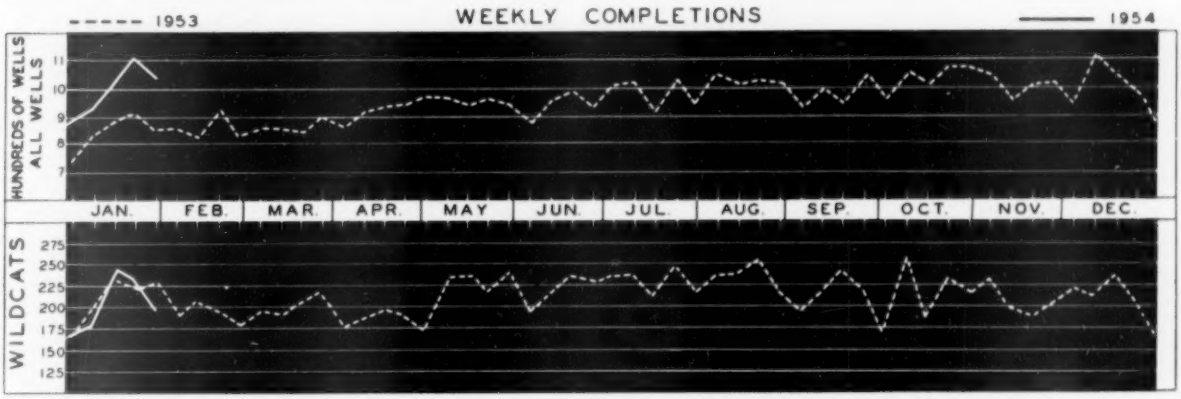
WYOMING

Converse County, Powell Unit: Union Oil of California 1 Unit, W½ SE SE 29-40n-73w. IP 40 BOPD, 500,000 cu. ft. g.p.d., Sussex discovery—new field Frontier 11,490 ft. TD 11,684 ft. PB 9,560 ft.

Fremont County, N. W. Winkleman: True, Brown & Fulton 9-1 Tribal, SE SW NE

(Continued on page 211)





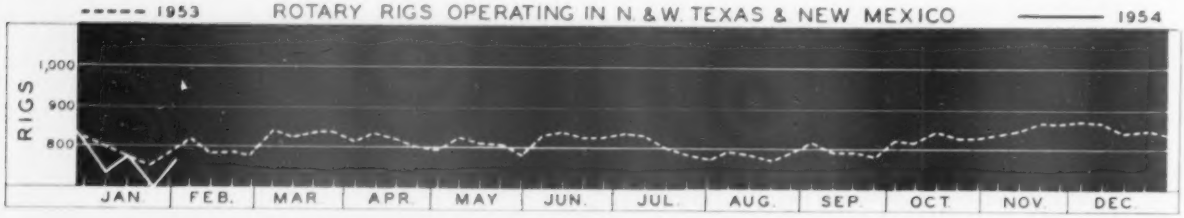
CURRENT STATISTICS

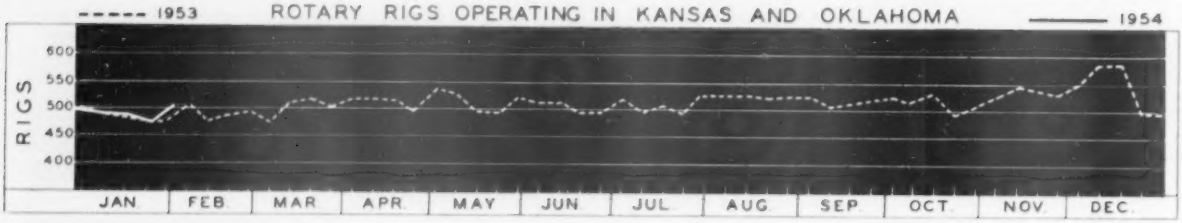
EXPLORATION

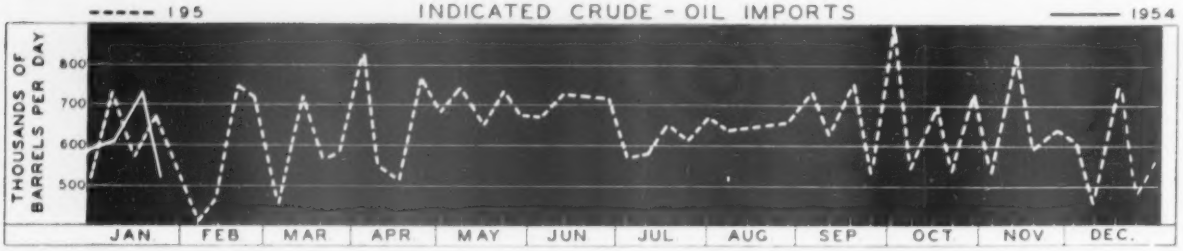
WEEKLY WELL COMPLETIONS . . . WEEK ENDED JANUARY 30, 1954

	Total of all wells					Jan. 30		Wildcat completions and discoveries					Cumulative total, 1954				
	Comp.	Oil	Gas	Dry	Footage	1954	1953	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
Pennsylvania-New York	45	22	3	*20	75,730	219	195	0	0	0	0	0	0	0	1	2	3
West Virginia	6	1	4	1	20,159	42	36	0	0	0	0	0	0	0	2	2	4
Ohio	12	4	1	7	24,252	74	74	0	0	0	1	1	0	0	2	1	3
Indiana	18	6	0	12	26,217	52	145	0	0	0	5	5	0	0	0	13	13
Kentucky	18	8	4	6	39,106	82	94	0	0	0	1	1	0	0	0	7	7
Illinois	46	26	0	20	118,020	224	171	0	0	0	7	7	0	0	0	40	40
Michigan	17	7	0	10	39,651	61	64	0	0	0	7	7	0	0	0	28	28
Kansas	83	49	4	†30	286,701	405	363	2	0	0	4	6	6	0	2	58	66
Nebraska	7	1	1	5	39,865	35	26	0	0	0	1	1	3	0	0	9	12
Oklahoma	191	127	3	‡61	682,036	870	534	3	0	0	12	15	11	0	2	63	76
Texas	383	218	23	142	1,727,713	1,491	1,223	23	2	1	87	113	68	8	11	369	456
North Central (Dist. 7-B & 9)	132	80	0	52	451,235	523	406	16	0	0	29	45	44	0	0	136	180
West (Dist. 7-C & 8)	91	63	0	28	509,501	352	291	3	0	0	18	21	12	0	0	69	81
Panhandle (Dist. 10)	22	13	7	2	68,162	66	53	0	0	0	1	1	0	0	2	4	6
Eastern (Dist. 5 & 6)	16	6	4	6	99,932	59	54	1	0	0	5	6	1	0	1	16	18
Gulf Coast (Dist. 2 & 3)	59	29	6	24	364,095	262	198	0	1	0	15	16	4	5	4	72	85
Southwest (Dist. 1 & 4)	63	27	6	30	234,788	229	221	3	1	1	19	24	7	3	4	72	86
Louisiana	66	41	8	17	354,226	353	216	1	0	0	2	3	10	4	3	23	40
Northern	39	26	7	6	109,002	208	105	0	0	0	1	1	2	0	0	7	9
Southern	27	15	1	11	245,224	145	111	1	0	0	1	2	8	4	3	16	31
Arkansas	4	1	0	3	15,064	75	40	0	0	0	0	0	4	0	0	8	12
Mississippi	3	0	0	3	22,844	31	37	0	0	0	0	0	0	0	0	10	10
Southeastern States	1	0	0	1	4,611	11	11	0	0	0	1	1	0	0	0	9	9
Montana	1	0	0	1	6,193	22	36	0	0	0	0	0	0	0	0	7	7
Wyoming	38	24	0	14	220,955	140	48	2	0	0	6	8	6	0	0	21	27
Colorado	17	9	1	7	94,964	80	44	0	0	0	6	6	2	0	0	41	43
Utah	0	0	0	0	0	8	7	0	0	0	0	0	0	0	0	3	3
New Mexico	24	9	10	5	134,775	137	113	0	0	1	3	4	0	0	1	11	12
California	59	49	2	8	268,136	210	188	6	0	0	6	12	10	0	3	39	52
North Dakota	5	4	0	1	38,346	24	20	0	0	0	1	1	1	0	0	6	7
Miscellaneous (S. D.)	1	0	0	1	5,248	5	6	0	0	0	1	1	0	0	0	5	5
Total United States	1,045	606	64	375	4,244,812	§4,651	3,691	37	2	2	151	192	121	12	27	775	§935
Total previous week	1,107	593	95	419	4,595,899			26	3	8	194	231	78	9	23	589	699
Total January 31, 1953	855	427	53	375	3,572,366			28	5	9	184	226	122	13	28	784	947

Service wells included: *17, †5, ‡2. §Revised.



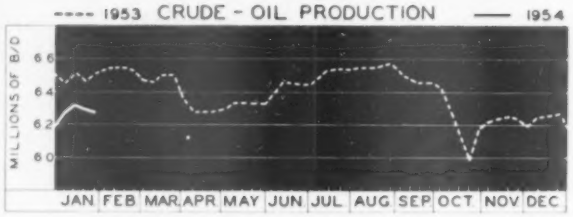


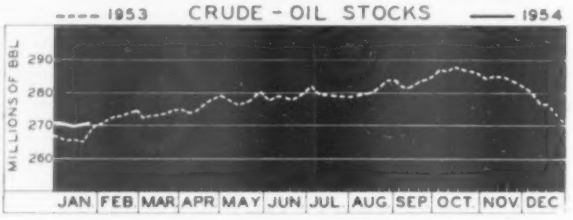


DAILY AVERAGE PRODUCTION FOR WEEK

	January 30 Crude oil	January 30 Lease condensate	January 30 total	Jan. 23 total
Alabama	4,400		4,400	4,500
Arkansas	74,850	550	75,400	75,550
California	1,006,900		1,006,900	1,007,700
Colorado	112,600		112,600	104,600
Eastern	58,600		58,600	58,900
Florida	1,475		1,475	1,475
Illinois	172,200		172,200	170,900
Indiana	32,000		32,000	31,500
Kansas	269,400		269,400	295,700
Kentucky	33,600		33,600	31,900
Louisiana	635,600	44,150	679,750	678,950
North	106,050	3,650	109,700	108,900
South	529,550	40,500	570,050	570,050
Michigan	33,300		33,300	33,600
Mississippi	88,900	3,800	92,700	93,050
Montana	33,900		33,900	34,400
Nebraska	18,300		18,300	18,700
New Mexico	198,925	900	199,825	199,725
Oklahoma	521,400		521,400	527,800
Texas	2,618,200	49,150	2,667,350	2,667,350
Dist. 1	39,500	450	39,950	39,950
Dist. 2	134,800	6,325	141,125	141,125
Dist. 3	417,300	23,750	441,050	441,050
Dist. 4	241,000	6,100	247,100	247,100
Dist. 5	44,900	450	45,350	45,350
Dist. 6	112,700	5,400	118,100	118,100
East Texas field	231,000		231,000	231,000
Dist. 7-B	121,400	50	121,450	121,450
Dist. 7-C	173,500	4,625	178,125	178,125
Dist. 8	839,000	1,500	840,500	840,500
Dist. 9	184,600	450	185,050	185,050
Dist. 10	78,500	50	78,550	78,550
Utah	4,400		4,400	4,700
Wyoming	238,500		238,500	238,700
North Dakota	14,300		14,300	14,600
Total U. S.	6,171,750	98,550	6,270,300	6,294,300
Change from previous week, down			24,000	
Canada	277,225		277,225	285,500
Total U. S. production January 1-January 30			188,712,850 bbl.	
Same period last year (crude plus cond.)			*196,628,475 bbl.	

*Includes 2,650,475 bbl. condensate.



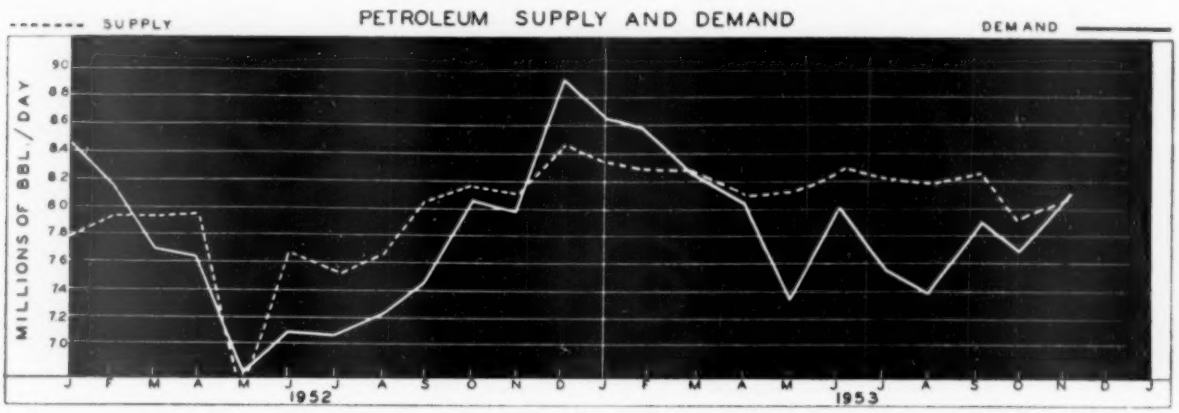


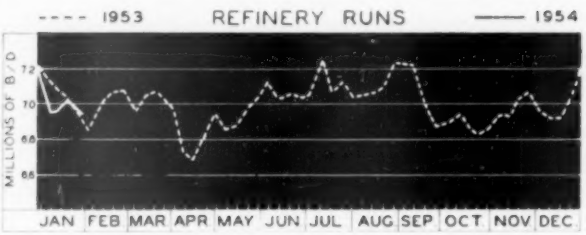
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

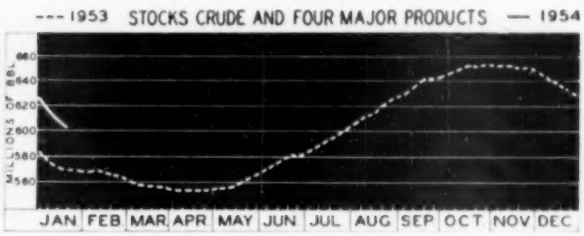
(Thousands of barrels)

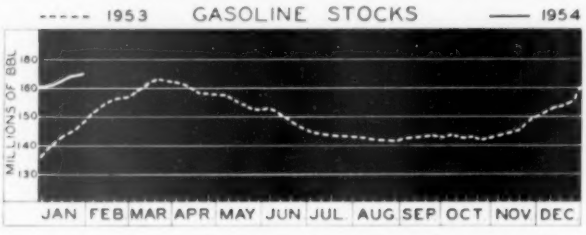
	Jan. 23, '54	Jan. 16, '54	Jan. 24, '53
Pennsylvania Grade	2,555	2,532	2,199
Other Appalachian	1,676	1,688	1,860
Illinois, Indiana, Michigan	11,464	11,608	10,356
Arkansas	3,296	3,380	3,271
Louisiana	15,968	16,190	15,194
North	2,812	2,796	2,446
Gulf	13,156	13,394	12,748
Mississippi	3,531	3,145	3,345
New Mexico	8,595	8,959	7,094
Oklahoma and Kansas	37,171	35,253	35,239
Texas	126,911	125,454	133,341
East Texas	11,186	11,766	11,273
West Texas	54,695	53,800	63,097
Texas Gulf	26,998	26,179	25,397
Other Texas	34,032	33,709	33,574
Rocky Mountain	16,680	16,633	14,497
California	33,060	34,020	32,098
Foreign	10,162	10,714	8,129
Total	271,069	269,576	266,623

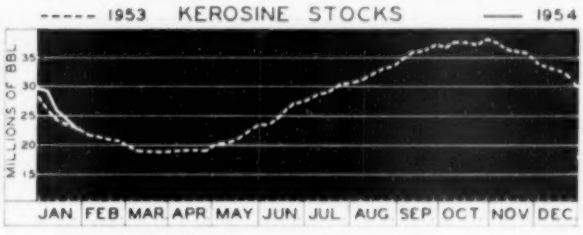
*Bureau of Mines. †Includes 2,842,000 bbl. in California.

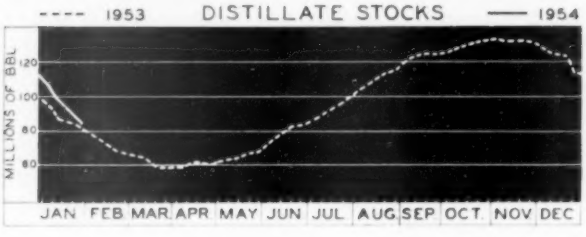


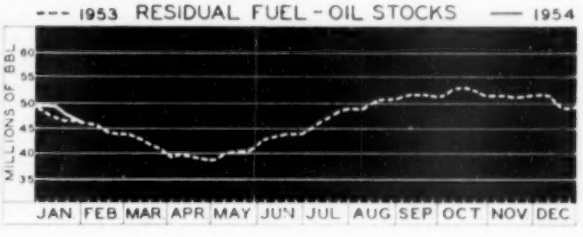










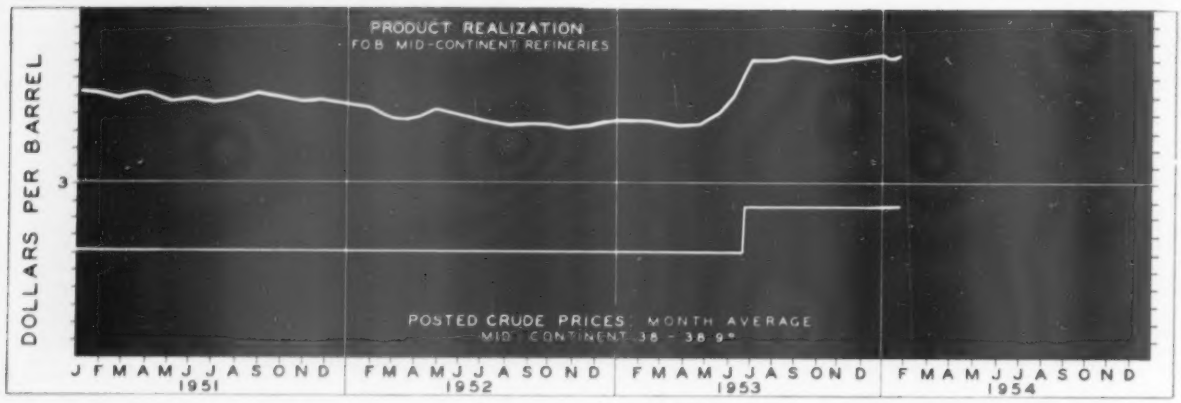


A.P.I. REFINERY REPORT, JANUARY 30

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, January 1953 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,044	439.1	40.6	258.0	253.5	35,770	9,582	30,081	10,552	1,080	452.9	48.5	259.9	260.9
Appalachian:														
District 1	117	45.8	8.1	25.1	14.6	4,301	499	1,158	716	116	48.9	9.3	19.6	19.2
District 2	97	52.6	7.6	19.1	15.3	2,023	486	599	194	92	47.6	7.9	14.3	16.1
Ind., Ill., Ky.	1,303	663.6	82.6	233.9	189.7	35,543	5,489	13,364	4,171	1,324	689.6	104.0	246.0	194.9
Okla., Kans., Mo.	541	349.8	7.0	134.6	41.4	18,769	1,087	8,310	996	582	330.9	12.6	141.1	62.4
Inland Texas	243	186.0	11.6	35.3	29.0	6,063	287	1,462	1,280	273	184.4	15.5	41.3	39.4
Texas Gulf Coast	1,724	791.6	152.0	378.9	218.3	24,811	2,288	9,335	5,673	1,742	790.3	155.7	441.4	253.0
La. Gulf Coast	551	267.0	57.8	153.1	45.6	10,253	1,451	4,566	1,223	524	239.5	56.3	130.4	50.9
N. La. and Ark.	87	39.7	7.3	24.3	6.6	4,063	358	955	129	86	35.5	8.5	18.3	8.1
Rocky Mountain:														
New Mexico	20	13.0		2.9	2.8	216		52	38	20	12.1	0.7	2.6	4.0
Other Rocky Mtn.	219	111.3	4.1	50.6	39.3	6,889	168	2,106	743	229	117.2	7.1	47.4	43.4
California	1,002	430.6	4.4	154.1	331.3	21,720	398	11,948	20,718	974	435.0	7.2	166.1	354.6
Jan. 30, 1954	6,948	3,390.1	383.1	1,469.9	1,187.4	170,421	22,093	83,936	46,433	7,042	3,383.9	433.3	1,528.4	1,306.9
Jan. 23, 1954	7,018	3,463.0	393.3	1,509.1	1,185.1	167,781	24,034	91,401	47,247					
Jan. 31, 1953	6,933	3,332.7	421.7	1,505.0	1,261.6	149,443	23,292	82,148	46,356					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines.


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
DOLLARS PER BARREL
3
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
J F M A M J J A S O N D
1951
F M A M J J A S O N D
1952
F M A M J J A S O N D
1953
F M A M J J A S O N D
1954

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate and fuel oil. Realization averaged $3.75 for week ended January 23, $3.73 for previous week, and $3.36 for January 1953. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of February 3, 1954. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	10.75-11	12.3-13.0	10.50-11.25
Premium gasoline	11.75-12	13.75-14.5	11.75-12.75
42-44 w.w. kerosine	9.125-9.375	10.7-10.9	9.25-9.5
No. 2 straw fuel oil	8.25-8.375	9.7-9.9	8.5-8.75
No. 6 residual	$1.45-1.55	$2.25-2.40	$1.85-1.95

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5.0	4.5	4.75
Grade 18-55	6.0	5.5	5.75

LUBRICATING OILS
South Texas

200 vis., No. 2-3 neutral	12.5
750 vis., No. 3-4 neutral	15.5
2,000 vis., 5-6 neutral	17

LUBRICATING OILS
Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	19
200 vis., No. 3 neutral, 0-10 pp.	14.25

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	19.5
180 vis., 10 p.t. neutral	22.5

WAX
Mid-Continent

132-134 A.M.P.	6.0

EXCESSIVE gasoline inventories in most marketing areas continued to exert pressure on gasoline prices, but heating-oil markets remain relatively firm despite the return of warmer weather to most areas.

Socony-Vacuum Oil Co., Inc., announced a reduction of 0.2 cent a gallon in prices of regular gasoline in its marketing territory. The change was effective January 29, and most of the major suppliers had met the decrease by the first of the week. This reduction is the third cut since the first of November for an over-all decrease of about 0.7 cent a gallon.

The area covered by the latest price change includes Maryland and all other East Coast states to the north. However, if the soft gasoline market continues, lower prices will spread to the southeastern states.

Natural gasoline lost another 0.125 cent on January 28, bringing the Group 3 price for Grade 26-70 down to 5.0 cents. For several days after the reduction, there was a spread in the price with some suppliers still quoting 5.125 cents. The new price is the lowest quotation for natural gasoline since the spring of 1950.

Adjustments in quotations for light heating oils in New York Harbor following variations in postings by different companies ended with an increase of 0.2 cent a gallon for barge delivery in New York Harbor. However, some material is reported available at the old price. Further strengthening of the Gulf Coast market would tend to limit these under-posting sales.

The rush by Mid-Continent refiners to get gasoline in the pipe line could cause a shortage of kerosine and distillate at pipe-line terminals in northern states. An extended period of cold weather would make it necessary to supplement heating oil stocks in North Central states with tank-car shipments out of the Mid-Continent.

CRUDE PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif.*	Oklahoma, Kansas	Gulf Coast Tex.†	West Tex.‡
14-14.9	$1.87			
15-15.9	1.93			
16-16.9	1.99			
17-17.9	2.05			
18-18.9	2.11			
19-19.9	2.18			
20-20.9	2.24	$2.50		$2.37
21-21.9	2.30	2.52		2.39
22-22.9	2.37	2.54		2.41
23-23.9	2.45	2.56		2.43
24-24.9	2.53	2.58	$2.91	2.45
25-25.9	2.61	2.60	2.93	2.47
26-26.9	2.69	2.62	2.95	2.49
27-27.9	2.76	2.64	2.97	2.51
28-28.9	2.83	2.66	2.99	2.53
29-29.9	2.91	2.68	3.01	2.55
30-30.9	2.97	2.70	3.03	2.57
31-31.9	3.04	2.72	3.05	2.59
32-32.9	3.12	2.74	3.07	2.61
33-33.9		2.76	3.09	2.63
34-34.9		2.78	3.11	2.65
35-35.9		2.80	3.13	2.67
36-36.9		2.82	3.15	2.69
37-37.9		2.84	3.17	2.71
38-38.9		2.86	3.19	2.73
39-39.9		2.88	3.21	2.75
40 and above		2.90	3.23	2.77

*Standard Oil Co. of California. †Upper Texas Gulf Coast ‡Includes New Mexico Permian.

Prices East of California effective June 15, 1953. California prices effective February 16, 1953. Pennsylvania Grade prices effective January 1, 1954.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Chapel Hill	2.83
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	3.76
Middle District	3.70
Southwest Pennsylvania	3.31
West Virginia	3.25
Ohio	3.24
Illinois Basin	3.02

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HELP WANTED

PROCESS ENGINEER: Young man, under 35, with Degree in Chemical Engineering or Petroleum Engineering (Refinery). Up to 3 years experience in oil refinery process work desirable but not absolutely necessary. Permanent position with a Texas Gulf Coast refinery. Please give complete personal resume. Box G-881, The Oil and Gas Journal, Tulsa, Oklahoma.

MAN EXPERIENCED in purchases, sales, and exchanges. Future unlimited. Past industry connections important. Box G-915, The Oil and Gas Journal, Tulsa, Oklahoma.

INSTRUMENT MAN NEEDED: Oklahoma refinery has opening for experienced instrument man. Must be able to install and service usual makes and types of refinery recorders and controllers. Normal 40 hour week with extra pay for call outs and overtime. Write giving resume of education, training, and experience. Replies will be held confidential. Box G-884, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER OR CHEMIST. Opportunity for a man having a knowledge of petroleum cracking catalysts and catalyst testing. Prefer young man with minimum of one or two years' experience in the petroleum industry. Job requires the ability to devise and direct catalyst testing procedures and interpret the results in terms of refinery operation. Submit resume, including salary requirement to: The Davison Chemical Corporation, Curtis Bay Works, Baltimore 26, Maryland.

EXPLORATION MANAGER

Must have 5 years' Executive Geological Background and extensive Lease Trading experience.

SALARY: to $20,000

This position is with a well established Independent Oil Company.

CHAS. J. LOVELESS, Personal Service
616 S. Main Tulsa, Oklahoma

EQUIPMENT INSPECTION ENGINEERS

SOUTH AMERICA

A major oil company affiliated with Standard Oil Company (N. J.) needs graduate engineers with several years' refinery process equipment inspection experience. Must be qualified to interpret codes and specifications, predict equipment renewals, and recommend replacement equipment.

Write giving age, marital status, education, and full details of experience.

Box 308-O
Radio City Station
New York 19, N. Y.

HELP WANTED

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

MANUFACTURER'S AGENT to represent manufacturer of oil field drilling equipment in the North Texas and Panhandle area. Box G-882, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Person experienced in the development, improvement and evaluation of petroleum products (not petrochemicals). Southwestern location, small community, integrated oil company of moderate size. Opportunity for advancement and supervisory experience. Box G-888, The Oil and Gas Journal, Tulsa, Oklahoma.

THE DEPARTMENT of Petroleum Engineering of a large state university is in need of a full time professor to teach logging and other courses in the application of engineering to geology. The research interest is unspecified but is hoped to be in geological engineering. Salary and rank open. Opportunity for company employment or sponsored research during the summer. Location South. Reply to Box G-920, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Cable tool drillers on the Bucyrus-Erie Spudder Machine, drilling water wells. Steady work. Egerer-Galloway Well Corporation, 1012 North Third Street, Milwaukee 3, Wisconsin.

SALES REPRESENTATIVES WANTED: Manufacturer of Oil and Gas Separating, Treating, and Metering Equipment wants commission Sales Representatives for following territories: (1) Louisiana, (2) West Texas, (3) East Texas, (4) North Texas, (5) Illinois, Indiana, and Kentucky, (6) Williston Basin, and (7) California. Territories available on exclusive contract basis to qualified salesmen. Please give details concerning present sales coverage, lines currently handled, and sales personnel when answering. All replies confidential. Box G-929, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL REFINERY MAINTENANCE ENGINEER

THE MAN WE WISH TO EMPLOY IS PROBABLY EMPLOYED BY SOME OIL COMPANY

He should be a graduate engineer and trained to supervise oil refinery shut downs, particularly catalytic cracking units. He must have the personality and ability to cope with labor relation problems and negotiations, and enjoy sales contact work with clients and prospective clients. We are only interested in interviewing men that make excellent presentations and have poise in all of the categories mentioned above. We will train the man chosen to our methods, and the position can lead to one of chief engineer or a managership. All replies will be held in strict confidence. We are contractors (headquartered in California) to the petroleum and chemical industries engaged on operations domestic and foreign. Salary commensurate with experience and ability. Kindly forward educational and business background information with photograph to

Box G-892, The Oil and Gas Journal
Tulsa, Oklahoma

HELP WANTED

CHEMICAL ENGINEER with broad experience in petroleum refining processes and sales of licenses to foreign prospects, willing to travel worldwide. Salary and incentives commensurate with qualifications. All applications strictly confidential. Box G-927, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Manufacturers representative for Chemical Company for State of Texas. Chemical or engineering background and oil field following important. Give details and background first letter. Box G-912, The Oil and Gas Journal, Tulsa, Oklahoma.

DESIGNERS

Work on the engineering of oil-refineries and chemical-plants. Opportunities for qualified structural and civil engineers.

C F BRAUN & CO
Engineers • Constructors
1000 SOUTH FREMONT
ALHAMBRA,
CALIFORNIA

WANTED

GAS OR PETROLEUM ENGINEER

for New York Main Office

with experience in the installation and operation of gasoline absorption plants, compression stations and oil refineries. Reply in confidence. State background and salary requirements.

Box G-926

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

HELP WANTED

PETROLEUM SALES

Large Midwest independent firm needs man experienced in handling refined fuel telephone sales. Knowledge of industry important and experience in independent dealer and pipe line sales desired. In reply give full experience, age and salary required. Replies held confidential. Address Box G-917, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE GEOLOGIST wanted by young Oil Company. Attractive salary together with overriding royalty. Kansas City, Oklahoma, Texas location. Transportation and expenses furnished for interview. All inquiries answered by March 1, 1954. Direct personnel abstract to Box G-905, The Oil and Gas Journal, Tulsa 1, Oklahoma.

PETROLEUM SALES REPRESENTATIVE

Midwest independent has opening for jobber contact man to handle petroleum products to independent jobbers in Kansas and Nebraska territory. Excellent opportunity for right man. In reply give full information including age, education, experience and salary required. Replies held confidential. Address Box G-918, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL INDUSTRY Employment Service, Tom Robinson, owner, 405 Tuloma Bldg., Tulsa, Oklahoma. For technical and trained oil industry personnel. Write for blank.

CHIEF CHEMIST experienced in Pod column work and gasoline plant process and product control testing to take charge of laboratory located at large gasoline plant in West Texas. Housing furnished and salary to be commensurate with qualifications of applicant. Please furnish experience record and salary expected. Our employees have been notified of this advertisement. Box G-776, The Oil and Gas Journal, Tulsa, Oklahoma.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column. Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

DIVISION GEOLOGIST

Wanted at New Orleans experienced aggressive geologist familiar with Gulf Coast. An exceptional man age range 35-45 desired. Salary open. Please furnish full particulars education and experience.

Box G-913
The Oil and Gas Journal
Tulsa, Oklahoma

WANTED TECHNICAL WRITER

Man or woman, college graduate, with background of chemistry or chemical engineering to assist in preparing articles and abstracts. Will work closely with outstanding petroleum chemist in Midwest. Liberal employee benefits. All applications strictly confidential. Please send complete resume giving age, education, experience, and salary desired to:

Personal Director
UNIVERSAL OIL PRODUCTS COMPANY
30 Algonquin Road
Des Plaines, Illinois

HELP WANTED

SEISMIC SUPERVISOR required by expanding and aggressive seismic contracting company. Should have ability to supervise any domestic area and have good professional contacts. Minimum requirements: college degree in geophysics or related fields and eight years' seismic experience. Good future. Tulsa location. Box G-705, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Several party chiefs — transit men with pipe line location experience. Also one Engineer graduate to head up organization for field surveys. Age 30 to 45. Write Box G-865, The Oil and Gas Journal, Tulsa, Oklahoma.

INDEPENDENT gas producer needs experienced production superintendent familiar with drilling, completions and producing operations in East Texas and North Louisiana. Replies confidential. Box G-891, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

PRODUCTION ENGINEER: 15 years experience, 5 in secondary recovery. Age 37, married. Interested in both good salary and opportunity. W. L. Stubblefield, 1612 East 12th, Tulsa, Oklahoma.

MECHANICAL ENGINEER—28. Single, now employed by major oil company. 3½ years field and office experience. Desires responsible position domestic or foreign. Complete resume upon request. Box G-930, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPELINE SUPERINTENDENT: Twenty years diversified experience supervising the construction, operations, maintenance of gathering systems, pump stations, deep water terminals, large diameter crude oil and product pipe lines. If you want experienced supervision that can organize and train personnel, maintain good management-labor relationship, write for interview. All inquiries kept confidential. Present position limits income growth. Excellent references available. Box G-925, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER: 29, family, 6½ years' experience with major in drilling, production, subsurface geology, and reservoir work. Desire position with smaller company or independent in Mid-Continent or Rocky Mountains. Box G-924, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, seven years' experience, wishes affiliation with independent contemplating entry into, or already interested in the Rocky Mountain Area. Box G-896, The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVE PILOT. Degree Geology, current CAA Airline Transport Rating twin Beechcraft and Douglas DC3, 4500 hours. Commercial rating single and multiengine land and sea. Release from Navy January. Desire flying position connection oil operations independent or company. Box G-878, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION MANAGER OR SUPERINTENDENT: 20 years' experience in drilling, producing and water flood operations with major and other companies. Graduate petroleum engineer. Excellent organizing and leading ability. Able to give practical direction to land, exploration, drilling, producing, clerical and engineering department activities. Oil property evaluation and appraisal experience. Desires position with established aggressive independent or syndicate interested in oil investment and/or organizing a producing firm. Top character and ability references. Available on 30 days, notice. Write Box G-923, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED IN CANADA

EXPERIENCED MAUFACTURER REPRESENTATIVE IN CANADA DESIRES ADDITIONAL ACCOUNTS. MANUFACTURERS NOW REPRESENTED INCLUDE GRAY TOOL CO. AND VENTURA TOOL CO. BEST OF REFERENCES.

LEIDECKER TOOL CO. LTD.
6921 104TH STREET
EDMONTON, ALBERTA CANADA
PHONE 35016

SITUATIONS WANTED

CHEMICAL ENGINEER, age 40, fifteen years' experience in the operation and design of Gasoline Plants, Refineries and Petro-Chemical Plants, specialized in the design and operation of high purity ethylene plants. Desires responsible position with a progressive Oil Company. Box G-791, The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVE ACCOUNTANT: 12 years experience, oil producing and pipe line. 8 years contracting and manufacturing. Desires position with aggressive company. Box G-893, The Oil and Gas Journal, Tulsa, Oklahoma.

PERSONNEL-CREDIT OPPORTUNITY. Eight years experience, personnel, credit, business management, store manager. Desire Tulsa or Dallas area location. Age 34. Box G-928, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER and Attorney. B.S. degree and Member Texas Bar; 7 years Oil Industry practically all phases. Box G-911, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER, 30, desires to relocate. Broad experience with major company. Background includes process engineering and operating, refinery economics, crude and product quality studies, refinery efficiency surveys. Box G-898, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise; Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 628, Phone No. **3-3141, Hobbs,** New Mexico.

PETROLEUM GEOLOGIST, 33, M.S., 8 years' experience in all phases of exploration and development, exceptional discovery record, presently serving as district geologist for major company in West Texas and New Mexico, desires responsible position in West Texas or Rocky Mountain area. Box G-894, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION ENGINEER or production foreman with 8 years' foreign experience and 18 years in the States. Wide experience in well completions, workovers, gas lift, strata frac and all secondary recovery. On foreign service handled all phases as supervisor, such as office management, transportation, public relations, personnel, as well as items listed above. Will consider domestic or foreign service. Box G-906, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED MANAGER: 12 years with firm of independent oil producers, experienced all phases producing industry including land, exploration, legal, geological, promotions, drilling and producing operations, joint-interest operations, evaluations, accounting, and income tax. Age 35, college degree. Desires opportunity with expanding and active company. Box G-919, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMIC INTERPRETER, 5½ years' experience with major, BS degree, majors in chemistry and geology, desires position combining both, in or near New Orleans area. Box G-916, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: Would like to represent aggressive independent in West Central Texas or North Central Texas. Conscientious and dependable. Salary or retainer. Would relocate. Rely to Box G-914, The Oil and Gas Journal, Tulsa, Oklahoma.

EQUIPMENT FOR SALE

USED WILSON "Titan" Drawworks with Type DR 40" Hydromatic Brake, Foster Catheads, Compound for three LRO Waukesha Engines; 4" x 50' Chiksan Rotary Hose, 3½" and 4½" IJ Drill Pipe; plus other accessories priced to sell. Jones & Laughlin Steel Corporation, Supply Division, Box 2481, Attention W. R. Clarke, Tulsa, Oklahoma.

USED COUPLINGS

500—3½" O.D., 500—4½" O.D., 1000—6⅝" O.D., 3000—8⅝" O.D., 1500—10¾" O.D., 2000—12¾" O.D. Dutchmans having been removed by machine. Priced reasonable upon request.

A. A. GILBERT PIPE & SUPPLY CO.
P. O. Box 986, Shreveport, La.

EQUIPMENT FOR SALE

5 KW OIL FIELD Type light plant—purchased new—used 18 months. MERIDIAN DRILLING CO., INC. Telephone CE 2-2055, Oklahoma City, Oklahoma.

40 ea. Cable Tool Stems—4" to 5½" O.D. 20 ea. 5½" x 36" Fishing Jars W 3¾" Joints. 95 ea. Bailers—4¼" to 10" O.D.—25' to 70 Lengths. 84 Sand Pumps—Spang—Larkin—Miller—All Sizes. Well Servicing Units—All Sizes—Truck Mounted or Skid Units. RL Cardwell Double Drum Spudder—Excellent Condition. General Tool & Supply Co., Box 4387, Oklahoma City, Oklahoma.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

PACKAGED GAS DESULFURIZATION UNITS

All sizes for pipe line and fuel gas requirements.

WRITE—WIRE—PHONE

GRAFF ENGINEERING CO.
3415 Westminster Ave.
Dallas, Texas
Phone Justin 2153

FULL FACTS, 8" x 10" PHOTOS AIRMAILED ON REQUEST, CALL LOUISVILLE—WABASH 6803

EQUIPMENT BUYS

D8 TRACTOR DOZER—CATERPILLAR DIESEL, Ser. #2UH990, equipped with cable type straight dozer, #25 rear D8CCU, elec. starting and lighting system with lights, crankcase guard, front pull hook, delivered new in 1951. We have just completed the following repairs: new pins and bushings, reworked transmission, new shafts and bushings in lower rollers. Master clutch has been replaced new and steering clutch reworked.
f.o.b. Paducah, Ky. $11,950.00

D7 TRACTOR DOZER—CATERPILLAR DIESEL, Ser. #3T13469, equipped with 7A angledozer, #24 front CCU. Also equipped with #25 rear PLU. Has elec. starter and four elec. lights, heavy duty equalizer spring, crankcase guard, large front idlers, front pull hook, 22" track shoes. Hour meter reads 2625. Tracks have recently been pinned and bushed and new brake lining and master clutch lining installed. Eight bottom rollers and top carrier rollers have been rebushed. #24 CCU has been reconditioned. Machine was new in 1951.
f.o.b. Louisville, Ky. $10,950.00

WHAYNE SUPPLY CO.

800 W. MAIN ST.—LOUISVILLE, KY.
ASHLAND, KY. • BOWLING GREEN, KY.
PADUCAH, KY. • EVANSVILLE, IND.

EQUIPMENT FOR SALE

FOR SALE: 2000 ft. 3½" bottle neck drill pipe, very good condition. $1.25 per ft. 1 set of 3½ to 5" tongs, $350.00. 1 4000 ft. brier swivel, $400.00. 1 GAK Waukesha 165 hp. mtr. with starting motor, $1650.00. Or will trade for casing or 2" upset tubing of equal value. F. H. Graves, P. O. Box 583, Phone 4726, Ardmore, Oklahoma.

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

NEW 12¾ SEAMLESS COUPLINGS $5.50 each. Edco Pipe & Supply, Box 151, Tulsa, or phone 4-5970.

FOR SALE—At our Oklahoma City warehouse, 1 used Allis-Chalmers Model UE skid well servicing unit $850.00. Also, 1 Model UM Allis-Chalmers tractor well servicing unit, $850.00. Cities Service Oil Patridge, Bartlesville, Oklahoma.

250,000 FT. 8⅝ o.d. pipe with collar and plain end, $1.00 per foot Oklahoma. Rogers & Lindquist, 620 Wright Building, Tulsa, Okla. Phone 3-2072—5-8850.

USED EXCELLENT CONDITION IN OPERATION

One Each (4¾" to 1") (13⅜" to 4½") LANDIS Leadscrew Receding Head Pipe Threading and Cutting Machine Motor Driven.

OILFIELD SALVAGE CO., INC.
Phone CHarter 6914
P. O. Box 2589 Houston

FOR SALE

Several mud logging trailers completely equipped, sleeping quarters, gas detectors, mud analysis equipment, ultra-violet oil detectors, intercom systems, mud analysis, equipment, microscope, two way radio equipment. Price range $3500 to $6000 payment on delivery. West Texas inspection site. Will deliver to purchaser. **Box G-890, The Oil and Gas Journal, Tulsa, Oklahoma.**

FOR SALE

Two model O-7 Murry and Tregurtha Harbormaster outboard propulsion units with twin 6-71 GM diesel engines. Each unit rated 330 HP. Designed for remote control starting, stopping and steering. Complete with barge mounting plates. Price reduced.

Four ZP Viking rotary pumps equipped with 36" 10 groove "D" section sheaves, together with three 75 HP 220/440 volt, 1175 rpm electric motors with sheaves and belts for driving pumps. Pump capacity 1050 gpm, 50 psi.

Four 8GR Worthington rotary pumps, capacity 1000 gpm at 200 psi, skid-mounted with sheaves and V-belts. Also four 6GR Worthington pumps, capacity 700 gpm at 200 psi. Two 5GR Worthington pumps, capacity 400 gpm at 200 psi. Ten 4GR Worthington pumps, capacity 200 gpm at 200 psi.

Six 3ugl and 4ugl Worthington centrifugal pumps mounted on steel base, capacity 1100 gpm at 300 psi.

One 10" x 18" Gaso piston pump mounted on skids, capacity 700 gpm at 125 psi.

SOHIO PETROLEUM COMPANY
407 N. 8th Street, St. Louis 1, Missouri
Attention: H. F. Fisher

EQUIPMENT FOR SALE

EVERYTHING in new and used equipment for well drilling. Fishing tools rented save money, get quotations from Pressey & Son, Pueblo, Colorado.

FOR SALE: 6000' 3½" seamless line pipe P.E. 35 to 40' random lengths. Clean inside and out. Beveled. 25c. M. J. Regan, Coffeyville, Kans.

REDA PUMP complete w. #4—50 Motor 45½ H.P., 650 Volt, 41.6 Amps. #50—Pump Housing, #3595—Switchboard w/recording Ammeter 3-600'—#4 Cable 125 Amp. Auto Transformer Accessories. Engine 225 H.P. Climax Type E-225 on Skid. Alternator G. E. 125—KVA. 100 KW, 440 V. A. C. w/Transformer. Flexible coupling and skid base. House—10' x 18' wood frame, w G I Roof and Siding on Skid. Engine—165 Hp Climax R-61 on Skid. Herndon Drilling Co. 421 Mayo Bldg., Tulsa. Phone 4-9700.

FOR SALE

COMPLETE COMPRESSOR STATION

Two 600 H.P. Type L.V.G. Ingersoll-Rand gas engines with high pressure compressors. Engines and compressors complete including Parkersburg Building. Located twenty miles from Houston. Contact—

PETROLEUM MANAGEMENT CO.
565 San Jacinto Building, Houston, Texas
Phone: CHarter 4781

FOR SALE

9 WORTHINGTON VACUUM PUMPS. Feathervalve, single cylinder, 25" dia. cylinder, 18" stroke.

38 BUFFALO GEAR PUMPS, size 1½" cap. 7½ G.P.M.

27 BUFFALO CO. TURBO FANS, type LL, size 3½" bore, conoidal fans.

37 STORAGE TANKS, 7' x 16', 95 barrel, horizontal, ¼" welded tank steel.

9 VACUUM STILLS, 9' x 30' max. press. 60-70 mm., hg. vacuum, max. temp. 660° F., approx. wgt. 36,000 lbs.

12 STEEL BOXES, 8' x 8' x 30', ¼" steel plate.

1 SURGE TANK, 10' x 14'.

3 BAROMETRIC CONDENSERS.

1 HORIZONTAL TANK, 4' x 9'.

1 STEAM SEPARATOR.

1 VACUUM VAPOR CONDENSER.

Prices less than 25% of cost, condition mostly excellent. Located St. Louis District. Material recently dismantled from oil refinery. Many more items too numerous to classify. Write for complete list.

M. E. FITERMAN CO.
2031 Railway Exchange Bldg.
St. Louis, Missouri
Garfield 2677

THE PURDY COMPANY
8754 Dodson Ave.
Chicago, Illinois
Bayport 1-2100

EQUIPMENT WANTED

WANTED—GOULDS PUMP, industrial horizontal high pressure piston type. In serviceable condition. Bato Schroeder, Route 2, Box 30, Canton, Kansas.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

WANTED TO BUY:

Good used 16" OD x ¼" wall Plain End Gas Line.

CENTRAL PIPE & SUPPLY CO.
Box 1466—Phone 4-7404
Lubbock, Tex.

EIGHTY-THOUSAND BBL. FLOATING ROOF TANK

Chicago Bridge make A.P.I. all welded 5 rings 120' x 40' located Illinois, sell where is or cutdown reerect any place. 3—10,000 bbl. bolted tanks 54' x 24'.

Phone 3-6141 **W. C. BERRY** **P.O. 1858, Tulsa**

EQUIPMENT WANTED

NOTICE: We buy, We sell equipment everywhere. If you want to sell or buy, contact Pressey & Son, Pueblo, Colorado.

WANTED: Used B. S. & B. or National Dehydrator Unit to handle 5 to 10 MMSCF of Gas per day, also same size scrubber, advise location, price and condition by letter, P.O. Box 103, Oklahoma City, Oklahoma.

BUSINESS OPPORTUNITIES

OIL EQUIPMENT AND SPECIALTY MANUFACTURERS—Wanted: Specialty Products for drilling and production, to handle on straight commission or as distributor. Area: Texas Gulf Coast, with other outlets throughout Texas. Facilities include sales personnel, warehouses, trucks. Gordon B. Nicholson, Tri-State Engineering & Service Co., Box 9083, Houston, Texas.

BOOKS FOR SALE

DOODLEBUGGING — DOWSING — DIVINING — A scientific and unprejudiced analysis of the influence of electromagnetic fields on psychic phenomena, with particular attention to divining (doodlebugging). PSYCHICAL PHYSICS by S. W. Tromp, Professor of Geology, Fouad 1 University, Cairo (Egypt), is a 534 page volume (153 illust.) in which the author analyzes all existing knowledge of divining phenomena. Oil operators will find this book thought provoking. Only 250 copies left. Write now for yours. Price $8.00. ELSEVIER PRESS, 402 Lovett Boulevard, Houston 6, Texas.

FOR SALE OR LEASE

FOR SALE OR LEASE: 3660 acres land in woods with 360 acre reservoir for duck hunting, 11 miles southwest of Stuttgart, Arkansas, 3 miles southwest of Lion Oil Company duck hunting reservation. Write W. H. Arnold, Box 781, Jonesboro, Arkansas.

LEASE AND DRILLING BLOCKS

CHEAP LEASES & ROYALTIES AVAILABLE: Due to other interests will sell my unproven acres to highest bidders. Wyoming—18,000 acres—leases. North Dakota—2,000 acres—leases. Colorado—480 acres—leases. North Dakota—800 acres—minerals. Write for list. Box G-887, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASE AND DRILLING BLOCKS

NEW MEXICO STATE LEASE, will sell 4,000 acre solid block semi-wildcat, good location. Box G-907, The Oil and Gas Journal, Tulsa, Oklahoma.

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IF YOU HAVE A LEASE BLOCK—good geology—located North Texas—preferably shallow drilling—will consider proposition. Box G-921, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL AND GAS LEASES for sale to highest bidder, to February 20, 1954—Comprising nine thousand acres near production and drilling wells in Mountrail County, North Dakota. E. G. Ranum, Valley City, N. Dak.

CALIFORNIA lease blocks: 17,000 acres Northwest Coalinga; 1,000 acres West Newhall. CECIL BLINN, 2911 Hermosita Drive, Glendale, California. Phone Citrus 3-2088.

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WILL TRADE OIL PAYMENT and or lease interest for complete portable rig with all equipment including pipe. Box G-922, The Oil and Gas Journal, Tulsa, Okla.

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FOR SALE CRUDE OIL

NOTICE

1. The Iraq Government calls those interested in purchasing all or part of the following quantities of Iraqi crude oil produced from the Kirkuk, Ain Zalah, and Zubair fields during the year 1955, to apply to the Ministry of Economics, Baghdad, or Iraqi Embassies, Legations or Consulates for terms and conditions of sale and qualities of crudes.

ESTIMATE OF AVAILABILITY AT SEABOARD OF 12½% ON QUANTITIES

	TRIPOLI			BANIAS	FAO
	I.P.C.	M.P.C.	TOTAL BLEND	I.P.C.	B.P.C.
1st Quarter	206,250	40,000	240,000	500,000	175,000
2nd Quarter	206,250	40,000	240,000	500,000	200,000
3rd Quarter	206,250	40,000	240,000	500,000	225,000
4th Quarter	206,250	40,000	240,000	500,000	250,000
	825,000	160,000	960,000	2,000,000	850,000

2. Purchaser is requested to indicate prices offered per ton of crude f.o.b. seaboard termined.
3. Purchaser is requested to indicate quantities of oil to be purchased.
4. Purchaser is requested to indicate currency in which payment is effected, preference being given to those who pay in scarce currencies.
5. Offers are accepted until May 31st, 1954.
6. Purchaser is required to deposit a bank guarantee to the amount of 1% of the value of the crude oil to be purchased, and the said guarantee to be valid up to 31st of July, 1954.
7. The Government will notify purchaser before the 15th July, 1954 whether his offer is accepted. If the offer is accepted, the purchaser shall make such arrangements as may be necessary before 31st July, 1954, for the establishment of a confirmed irrevocable letter of credit with a bank acceptable to the Government, such credit to be in the amount of the value of the crude oil to be purchased.
8. The Government will consider offers for purchasing Iraqi Crude Oil for periods extending over one year.

Although a separate "not production" figure has been given for Mosul Petroleum Company Limited, we must point out that oil of that Company will not be available separately at the terminals but will probably be available only at Tripoli in a blend with Kirkuk Oil of approximately one part Ain Zalah oil to five parts Kirkuk oil.

Contact: Permanent Delegation of Iraq
22 East 73rd Street
New York 21, N. Y.

Levingston Buys Mattingly Shipyard Interests

Ed T. Malloy, president of Levingston Shipbuilding Co., Orange, Tex., has announced the purchase by Levingston stockholders of all the interest in the shipyard owned by P. H. Mattingly. The transaction also involved the purchase by Mattingly of practically all of the stock in Marine & Petroleum Supply Co., Orange, according to Malloy, who was also chairman of the board of directors of the supply firm.

The stockholders of Levingston, who served on the board of directors of Marine & Petroleum Supply, have resigned from the latter company, and Mattingly has severed his connections with Levingston Shipbuilding Co.

WILDCAT COMPLETIONS

(Continued from page 202)

13-2n-2w (WRM). Dry. TD 5,656 ft. Tensleep 5,632 ft.

Pavilion area: Gulf Oil 1 Mae Rhodes, C NW NW 3-3n-2e (WRM). Temp. abandoned. TD 10,950 ft.(?) Mesaverde 5,780 ft.

Natronal County, Notches area: Trigood Oil J-1 State, C NE NE 16-37n-85w. Dry. TD 3,155 ft. Phosphoria 2,970 ft.

Park County, Frost Ridge: Richfield Oil 1 Unit, NW NW Lot 4-6-50n-101w. Dry. TD 8,122 ft. Madison 7,619 ft.

Heart Mountain: Jewell Oil & Gas Corporation 1 Bea-Government, Lot 6-18-54n-102w. Suspended. TD 2,100 ft.

Sweetwater County, N. W. Lost Soldier: Oil Corp. of America 1 Government, E½ NE NE 4-26n-90w. Shut down indefinitely. TD 6,762 ft. (?) Tensleep 6,750 ft.

Weston County, Wild Horse Butte area: Albert L. Smith 1 Demsey Drilling Co., SW SE NW 18-44n-64w. IPP 225 BOPD, Newcastle discovery—new field. Newcastle sand 5,372-95 ft. TD 5,434 ft.

COLORADO

Kit Carson County: Al Ward & Son 1 Brachtenbach, SW SW NW 22-8s-47w. Dry. TD 2,941 ft. Skull Creek 2,894 ft.

Logan County: Duff & Swedlund 1 Domonic De Soto, NW SW NE 19-8n-52w. Dry. TD 4,750 ft. Skull Creek 4,727 ft.

British-American 1 Brainard, C NW SW 28-9n-53w. Dry. TD 5,184 ft. "J" sand 4,451 ft.

British-American 1 Government-Volk, C NE NE 27-11n-53w. Dry. TD 5,820 ft. Lakota 5,626 ft.

Mesa County, Sinbad: J. M. Huber 1 Sinbad Unit, CS½ SW SW 16-49n-19w (NMPM) Temp. suspended. TD 10,316 ft.

Morgan County: S. D. Johnson 1 Mowery, NW NW SW 17-2n-56w. Dry. TD 5,420 ft. "J" sand 5,302 ft.

MANITOBA

Northern 2-16 Reston, LSD 2, 16-7-27w1. Dry. TD 3,210 ft.

LEGAL

Sealed bids for Oil and Gas Mining leases on restricted Allotted lands of the Fort Berthold Indian Reservation, North Dakota, will be received at the Office of the Superintendent of the said reservation, New Town, North Dakota, until 2:00 P.M., Central Standard Time on February 16, 1954, and will be opened immediately thereafter in the presence of such bidders as may attend. The total allotted land covered by the advertisement is 35,654.48 acres. All of this land is located in the counties of Dunn and McKenzie, State of North Dakota. For additional information write the superintendent of the Fort Berthold Agency, New Town, North Dakota, or call the Agency Land Office, Phone 654, New Town. Ralph M. Shane, Acting Superintendent.

LEGAL

U.S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D.C. Notice is hereby given that approximately 400 acres of land in three parcels. Parcel #1, T. 35 N., R. 2W., sec. 17, $W\frac{1}{2}SE\frac{1}{4}$, sec. 20, $NW\frac{1}{4}NE\frac{1}{4}$, total 120 acres; Parcel #2, T. 35 N., R. 2W., sec. 33, $W\frac{1}{2}SW\frac{1}{4}$, $NE\frac{1}{4}SW\frac{1}{4}$, total 200 acres; Parcel #3, T. 34 N., R. 3 W., sec. 1, $E\frac{1}{2}SE\frac{1}{4}$, total 80 acres, within the known geological structure of the Kevin-Sunburst field, Montana, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1 p.m., Eastern Standard Time, February 10, 1954, when bids will be opened. Details of the lease offering, how and where to submit bids, may be obtained from the Bureau's Washington office. L. E. Hoffman, Chief, Division of Minerals.

Northern 2-28 West Sinclair, LSD 2, 28-7-29w1. Dry. TD 3,365 ft.

SASKATCHEWAN

Socony-Sohio 15-6 Chipperfield, LSD 6, 15-28-17w3. Dry. TD 2,299 ft.

Shell A-5-32 Halbrite, LSD 5, 32-6-11w2. Dry. TD 5,050 ft.

Tide Water-Imperial 1 Wawota Crown, $SW\frac{1}{4}$ 12-11-34w1. Dry. TD 3,935 ft.

ALBERTA

Banff-Signal-Seaboard 14-2 Elnora, LSD 14, 2-35-24w4. Dry. TD 7,502 ft.

Amerada 3-3 Crown AB, LSD 3, 3-70-23w5. Dry. TD 9,077 ft.

Union-Imperial 16-30 Thiessen, LSD 16, 30-50-19w4. Dry. TD 3,840 ft.

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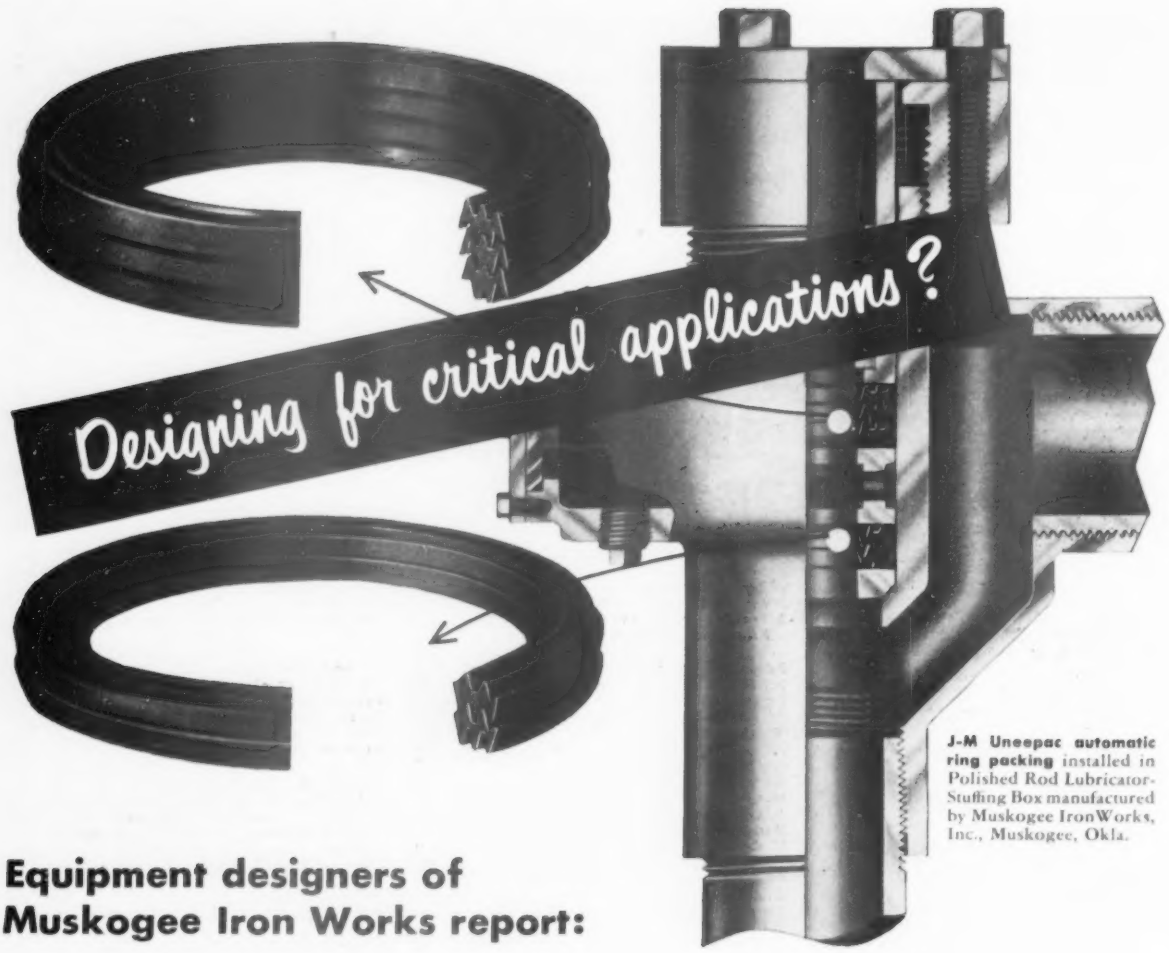

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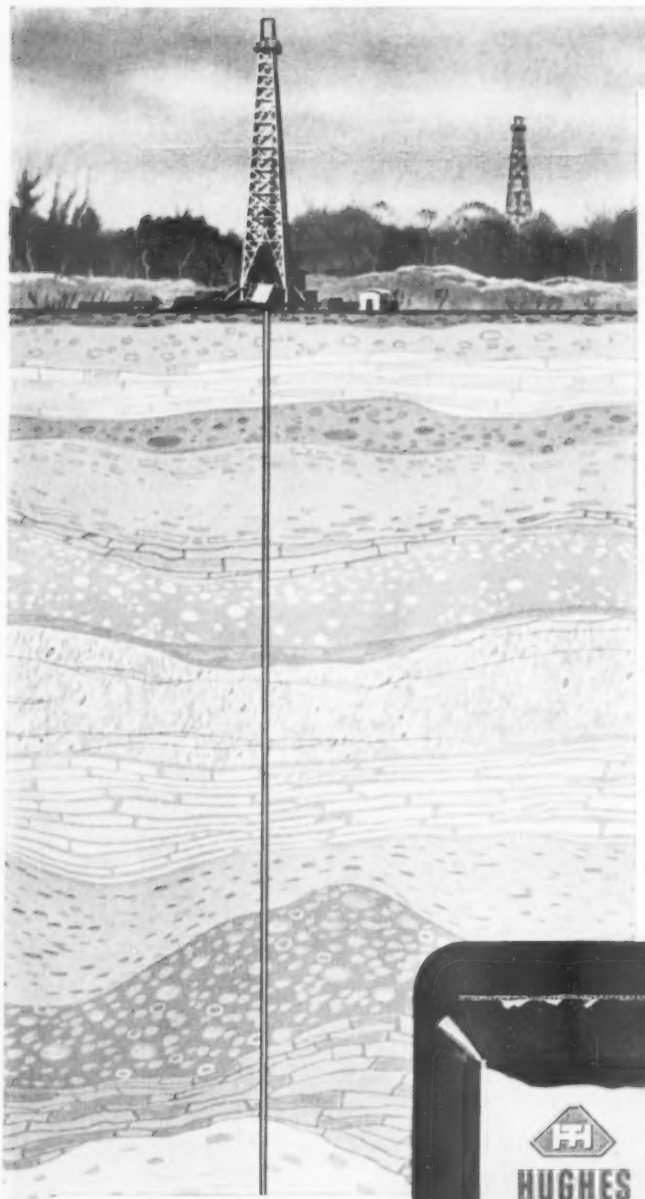

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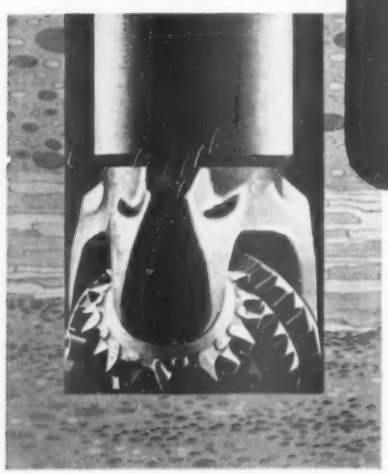
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